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ABSTRACT

Complete texts of presentations and discussions at a 1975 UNESCO symposium on information systems in ongoing scientific and technical research are included in this volume. Forty-five papers were presented in four sessions: (1) ongoing research information in the service of science and science policy; (2) problems in developing and operating information systems; (3) user needs; and (4) value and mechanisms of international exchange. Discussions and/or panel discussions follow each group of presentations. Participant list and author index are provided. Papers and discussions are in English or French, with most of the text in English. (KP)

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UNISIST INTERNATIONAL SYMPOSIUM ON INFORMATION SYSTEMS AND SERVICES IN ONGOING RESEARCH IN SCIENCE

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PREFACE

It is becoming generally accepted that the application of scientific knowledge, on which the development of technology itself is based, is one of the more effective ways of achieving social and economic progress.The access to relevant and timely scientific and technological information is basic to the realization of such application.

Scientific knowledge is widely dispersed. Its full utilization depends on the existence of information systems and services which are able to provide up-to-date and reliable information when it is required.

Information systems and services covering the primary and secondary literature provide only part of the information required, since several years generally elapse from the time that a research and development /R & D/ project is initiated until its results are published. Conventional information services seldom provide a reliable and current overview of the national R & D effort; on the other hand, a well functioning service using a data base on current R & D may provide a vital information source to science policy-makers, R & D managers and the scientific community as a whole.

As a result, it is now apparent that an increasing number of countries are concerned with the collection, organization and dissemination of information about ongoing research in science and technology. In that respect, some have organized small, manual information services, some have developed fully-computerized systems, many are in the process of planning systems and services for the management of ongoing research information not yet available in the open literature, but of great value to planners, policy-makers and researchers in science and technology.

The time seemed appropriate for those involved in activities of this kind to meet and discuss their current efforts, review the problems associated with the development, operation and use of these systems and services and investigate the possibilities for future compatibility and exchange of information.

UNESCO, under its UNISIST programme, undertook to meet the need for such a forum by organizing, in collaboration with the Smithsonian Science Information Exchange /SSIE/ of USA, the first International Symposium for all interested professionals from UNESCO Member States. The Symposium was held on 27-29 October 1975 at UNESCO House, Paris. Some travel grants for participants from the developing countries were made available by UNESCO and the International Development Research Centre /IDRC/ of Canada.

The Chairman of the Symposium was Dr. David HERSEY, President of SSIE. Nearly 200 participants from 50 countries attended the meeting. The considerable interest of developing countries in the subject was indicated by the fact that one half of the countries represented were from developing areas.

From the animated debate it was manifest that developing and developed countries were equally concerned and interested in creating specialized services which in turn would exchange data on a regional or international level.A significant feature of the Symposium was an unprecedented consensus on the necessity for international co-operation in this field. Compatibility of computerized systems for storing and retrieving scientific information was found to be a prerequisite for developing automated information services; this is a highly complex and multifaceted problem which cannot be solved at the national level but requires world-wide international co-operation.

During the three days of discussions many speakers and participants made suggestions concerning the future role of UNESCO in the field of the transfer of information about ongoing research in science, and numerous proposals were brought forward on how UNISIST could assist in the promotion of standards and methods and in the harmonization of international efforts in this field. As an immediate follow-up of the Symposium, the establishment of an Ad Hoc Committee or a working group to study the most urgent issues of information on ongoing research and to advise the UNESCO Secretariat in the development of a plan of action is under consideration, as is the publication of a directory of existing information systems and services in ongoing research.

In agreement with UNESCO, the Proceedings of the Symposium are published by the Hungarian Central Technical Library and Documentation Centre.

PREFACE

On admet de plus en plus que l'utilisation des connaissances scientifiques, sur laquelle repose le développement même de la technologie est l'un des moyens les plus efficaces d'assurer le progrès économique et social. Or, pour utiliser ces connaissances, il est indispensable d'avoir accès à des informations techniques et scientifiques pertinentes et récentes.

Les connaissances scientifiques sont très dispersées. Si l'on veut les utiliser pleinement, il faut des systemès et des services d'information qui soient capables de fournir des renseignements récents et fiables, au moment où on en a besoin.

Les systèmes et les services d'information qui couvrent les sources primaires et secondaires ne fournissent qu'une partie des renseignements nécessaires, puisque plusieurs années s'écoulent généralement entre le moment où une activité de recherche et développement /R et D/ est entreprise et le moment où ses résultats sont publiés. Les services d'information traditionnels donnent rarement une vue fiable et actuelle des efforts déployées par les différents pays en matière de recherche et développement, or, un bon service qui utilise une base de données relatives aux travaux actuels de R et D peut constituer une source vitale d'informations pour ceux qui élaborent les politiques scientifiques, pour les responsables de la R et D et pour la communauté scientifique dans son ensemble.

En conséquence, il est maintenant évident qu'un nombre croissant de pays ont intérêt à assurer le rassemblement, l'organisation et la diffusion des renseignements relatifs aux recherches scientifiques et technologiques en cours. A cet égard, certains ont organisé de petits services où l'information est diffusée manuellement, certains ont mis au point des systèmes entièrement automatisés, nombre d'entre eux procèdent à la mise en place de systèmes et de services de gestion des renseignements relatifs aux recherches en cours qui, bien que n'étant pas encore publiés, présentent une grande importance pour les planificateurs, les responsables de la politique scientifique et technique et les chercheurs dans ce domaine.

Le moment semble venu pour que tous les intéressés se réunissent pour discuter de leurs travaux, examiner les problèmes liés à la mise au point, au fonctionnement et à l'utilisation de ces systèmes et services et étudier les possibilités d'assurer à l'avenir la compatibilité et l'échange des renseignements.

C'est à cette fin que l'UNESCO a organisé au titre de son programme UNISIST, en collaboration avec le Smithsonian Science Information Exchange /SSIE/ des Etats-Unis d'Amérique, le premier colloque international sur les systèmes et services d'information concernant les recherches scientifiques en cours à l'intention de tous les spécialistes intéressés des Etats membres de l'Organisation. Le colloque s'est tenu à la Maison de l'Unesco, à Paris, du 27 au 29 octobre 1975. Les frais de voyage de certains participants de pays en développement ont été payés par l'UNESCO et le Centre de recherche pour le développement international /CRDI/, du Canada.

Le colloque a été présidé par M. David HERSEY, président du SSIE. Près de 200 personnes représentant 50 pays y ont assisté. Le fait que la moitié des pays représentés étaient des pays du Tiers Monde montre le très grand intérêt que ces pays ont manifesté pour les questions à l'ordre du jour.

Le débat animé a montré clairement que les pays en développement et les pays développés s'intéressent également à la création de services spécialisés qui échangeraient des renseignements sur le plan régional ou international. Le colloque a été marqué, et c'est là un de ses traits saillants, par un consensus sans précédent sur la nécessité d'une coopération internationale dans ce domaine. Les participants ont estimé que la compatibilité des systèmes de stockage et de recherche automatiques des renseignements scientifiques était une condition préalable à la mise en place des services d'information automatisés; il s'agissait là d'un problème complexe, présentant de multiples aspects, qui ne saurait être résolu à l'échelon national et qui exige une coopération internationale à l'échelle mondiale.

Au cours des trois journées de débats, de nombreux orateurs et participants ont formulé des propositions au sujet du rôle futur de l'UNESCO dans le domaine du transfert des renseignements relatifs aux recherches scientifiques en cours, ainsi que de nombreuses suggestions sur la façon dont l'UNISIST pourrait faciliter l'adoption de normes et de méthodes et harmoniser les efforts internationaux dans ce domaine. Comme suite immédiate du colloque, la création d'un comité ad hoc ou d'un groupe de travail qui serait chargé d'étudier les problèmes les plus urgents de l'information sur les recherches en cours et de conseiller le Secrétariat de l'UNESCO sur l'élaboration d'un plan d'action est envisagée, de même que la publication d'un répertoire des systèmes et des services d'information existants sur les recherches en cours.

En accord avec l'UNESCO, les actes du colloque sont publiées par la Bibliothèque technique centrale et centre de documentation de Hongrie.

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INTRODUCTION

The Symposium programme was structured in such a manner as to provide information and stimulate discussion of value, not only to those engaged in or planning for the actual operation of ongoing research information systems and services, but also to current and potential users at both research and policy making levels.

The programme focused on four central themes:

1. Perspectives: Ongoing Research Information in the service of science and science policy /Session I/

Under this theme, attention was drawn to the importance attached to information about ongoing research and the application of that information to the changing needs of the international scientific and technical communities. This opening session was intended to provide an overview of the relationships between the systematic collection and dissemination of information on research in progress and the information requirements of scientists, research managers and science policy makers in both developing and industrialized nations as well as at the international level.

2. Existing and emerging information systems and services: problems of development and operation /Session II/

This theme included presentation and discussion on the full range of systems currently in operation: from small, national services designed principally to provide for the periodic publication of directories on research in progress to large fully-computerized systems providing a variety of output services. It covered national and international data bases of ongoing research in specific areas of research activity as well as national systems covering all fields of science. Papers included in this session discussed inter alia: a/ establishing the need for such systems and services; b/ difficulties encountered in their operation and growth; c/ approaches used in identifying essential data elements and d/ techniques for minimising operating costs. This session included a panel discussion on "Problems and methods in the collection and processing of ongoing research information".

3. Meeting users needs: Current services and future possibilities /Session III/

This theme dealt with the information requirements of present and potential users from both developed and developing countries. Attention focused on how and in what ways the relevant information could be managed to meet these requirements. This session covered approaches to determine user needs and discussed what might be done to modify system outputs and services to better satisfy the various user communities. This session also included a panel discussion on "Problems and methods in meeting user needs".

4. International Exchange: its value and mechanisms for accomplishment /Session IV/

Discussions under this theme included the value of and problems encountered in international exchange; the need for standardization of selected data elements and formats; the question of language; the practicability of utilization by one country of subject indexing applied by another; the usefulness of a basic vocabulary, with broad subject levels; the role of UNISIST; and the technical and economic aspects of exchange between various national and international systems.

INTRODUCTION

Le programme du colloque a été conçu pour permettre aux participants de s'informer et d'engager un débat dans l'intérêt non seulement de ceux qui travaillent au fonctionnement ou à la conception des systèmes et des services d'information sur les recherches en cours, mais également de ceux qui, chercheurs ou responsables politiques, en sont les usagers ou sont appelés à le devenir.

Quatre grands thèmes furent abordés:

1. Les perspectives: l'information sur les recherches en cours au service de la science et de la politique scientifique /Thème I/

Sous cette rubrique, l'attention des participants a été attirée sur l'importance qui s'attache à l'information relative aux recherches en cours et à son application aux besoins changeants des milieux scientifiques et techniques internationaux. De cette séance d'ouverture devait se dégager une vue générale des rapports qui existent entre la collecte et la diffusion systématique de l'information sur les recherches en cours, d'une part, et, d'autre part, les besoins d'information des scientifiques, des responsables de la recherche et des responsables de la politique scientifique aussi bien à l'échelon national - dans les pays en voie de développement et dans les pays industrialisés - qu'à l'échelle internationale.

2. Les systèmes et services d'information qui existent déjà ou sont en train de se créer: problèmes de mise en place et de fonctionnement /Thème II/

Sur ce thème, le débat fut consacré à la présentation et à l'examen de toutes les catégories de systèmes qui fonctionnent à l'heure actuelle, depuis les petits services nationaux principalement destinés à publier, périodiquement, des catalogues de recherches en cours, jusqu'aux grands systèmes entièrement automatisés qui sont à même de fournir toute une gamme de services. Il y a été aussi bien question des bases de données nationales et internationales relatives aux recherches en cours dans un domaine déterminé, que des systèmes nationaux qui embrassent tous les secteurs de la science. Les participants entendirent, lors de cette séance, des exposés portant notamment sur les points suivants: a/ détermination de la nécessité de systèmes et de services d'information sur les recherches en cours; b/ difficultés auxquelles se heurtent le fonctionnement et le développement de ces systèmes et services; c/ les méthodes utilisées pour déterminer les éléments de données essentielles; d/ techniques permettant de réduire les frais de fonctionnement au minimum. Il y eut également dans cette session une discussion de groupe sur "La collecte et le traitement des informations sur les projets de recherche en cours: problèmes et méthodes".

3. Comment répondre au besoins des usagers: services actuels et possibilités /Thème III/

Sur ce thème, le débat fut consacré aux besoins d'information des usagers présents et à venir des pays développés et des pays en voie de développement. Il a été étudié comment et par quels moyens il convient d'organiser l'information afin de répondre à ces besoins. Il fut également question des méthodes pour déterminer les besoins des usagers et étudier ce qui pourrait être fait pour modifier la production des systèmes et la nature des services afin de mieux répondre aux besoins des divers groupes d'usagers. Lors de cette session il y eut également une discussion de groupe sur "Comment satisfaire les besoin des utilisateurs: problèmes et solutions".

4. L'échange international: sa valeur et les mécanismes de sa réalisation /Thème IV/

Le débat a porté sur l'intérêt de l'échange international et les problèmes qu'il soulève: la nécessité de normaliser les éléments et les formats de données retenus; le problèmes de la langue; la possibilité d'utilisation par un pays de l'indexage par matière appliqué par un autre pays; l'utilité d'un vocabulaire de base avec une classification générale par matières; le rôle de l'UNISIST; les aspects économiques et techniques de l'échange entre différents systèmes nationaux et internationaux.

SESSION I

PERSPECTIVES: ONGOING RESEARCH INFORMATION IN THE SERVICE OF SCIENCE AND SCIENCE POLICY

LES PERSPECTIVES: L'INFORMATION SUR LES RECHERCHES EN COURS AU SERVICE DE LA SCIENCE ET DE LA POLITIQUE SCIENTIFIQUE

J. HARRISON,
Assistant Director General for
Science,
UNESCO

Session I

Paper 1

OPENING REMARKS

Ladies and Gentlemen,

It was in October 1971, just about four years ago, that in this very room eighty Member States unanimously approved and launched the UNISIST programme - a programme jointly prepared by UNESCO and the International Council of Scientific Unions /ICSU/ in response to the "information challenge" with which the scientific communities of the world is confronted, and in recognition of the vital role which scientific and technical information has come to play in the development of nations.

This "information challenge", as you well know, is rooted in the proliferation of research and development programmes, the expanding volume of published information resulting from these programmes, the mounting costs of developing information systems and services to handle this information to meet users' needs, the lack of compatible and common methodologies, and a worldwide concern over the widening technological gap between developed and developing countries resulting from these unresolved problems.

In order to discharge its responsibilities in this area, UNESCO has actively developed the UNISIST programme in close collaboration with Member States, the UN specialized agencies, the governmental and non-governmental organizations and the international communities of scientists, engineers and information specialists.

It seems natural that we are gathered here today to discuss a specific aspect of this overall problem of information transfer: that of current research in science.

Ladies and Gentlemen, in opening this "International Symposium on Information Systems and Services in Ongoing Research in Science", I should like to tell you how happy I am to welcome the participants, whose very number is sufficient evidence of the interest aroused all over the world by the questions that you are going to discuss. I am happy to greet you here in UNESCO House - in the name of the Director General. It is gratifying indeed to see that the subject of the symposium has attracted specialists from all continents and is the source of such interest.

UNESCO, under its UNISIST programme, has, of course, on many occasions brought together highly qualified people to deal with questions relating to the transfer of scientific and technical information. The task entrusted to you, however, is unprecedented. This is in fact the first international symposium of its kind. It is the first move of this nature, which may be taken as foreshadowing and preparing the way for future collaborative developments in this area among nations.

In opening this international symposium, I wish to thank all those of you who have contributed papers and those who will be acting as moderators and members of panels. I wish to greet very warmly Mr. L.MALAVARD, President of the Bureau national d'information scientifique et technique /BNIST/, France, and Prof. E.WESTRUM, Secretary General of ICSU/CODATA who have kindly accepted the invitation to open this symposium with me.

May I express our deep gratitude to Dr. D.HERSEY, President of the Smithsonian Science Information Exchange of USA who has chaired the Programme Committee and has shared with the Secretariat a major load in the preparation of this symposium. His experience in running a most comprehensive information system in current research and his understanding of the complex issues involved have been crucial in the organization of the work of this programme.

I should like to take this opportunity to also express our appreciation for the contribution made by the US National Science Foundation to assure the participation of the Smithsonian Science Information Exchange, and the generous contribution made by IDRC /The International Development Research Centre of Canada/ to help UNESCO assist some participants from the developing countries to attend the symposium.

Ladies and Gentlemen, we are here today because the time seems appropriate to look carefully at that portion of scientific and technical information that is not yet available in the open literature and which constitutes a valuable resource to planners, policy-makers, and researchers in science and technology.

It is apparent that an increasing number of countries are concerned with the collection, analysis, organization and dissemination of information about current research in science and technology, mostly at the national level, but also at the regional and international levels. Some have organized small, simple information services; some have invested in fully computerized systems; many are in the process of making inventories, publishing directories, and planning systems and services for the management of ongoing research information.

It may be appropriate to recall at this point that the purpose of this forum is threefold:

1. to expand international understanding of the need and uses of information on research in progress, with a view to narrowing the gap existing between developed and developing countries;

2. to stimulate the development of improved methods for information collection and dissemination and

3. to encourage worldwide exchange among national and international information systems and services of this type.

Without seeking to anticipate the results of your discussions, I should like to state that UNESCO, for its part, is ready to assume the responsibilities that devolve upon it from its Constitution and in pursuance of the specific tasks assigned to it by the General Conference for carrying out activities that meet specific needs in this area. Our interests here are manifold.

In the science sector of UNESCO there are at least three divisions which are directly concerned with some aspects of this problem:

a/ the Division of Scientific Research and Higher Education, whose Director, Dr.PASSMAN, will act as moderator of Session II, part 4;

b/ the Division of Science and Technology Policy, whose Director, Mr. de HEMPTINNE, will act as moderator of Session III, part 2, and

c/ the Division of Scientific and Technological Information, /responsible for the UNISIST programme/ and whose Director, Mr. A.WYSOCKI, will present a paper on UNISIST at the conclusion of the symposium.

Ladies and Gentlemen, UNESCO's responsibilities do not come to an end with the organization of the present symposium and the creation of a forum which will allow you to interact for three days.We plan to listen carefully to the discussions, debates, suggestions and various issues raised. These we hope to publish, together with the papers presented at the symposium, in the Proceedings. We shall look upon these discussions as a source of ideas and an expression of needs to guide us in our future activities.

It is a recognized fact that scientific and technical information systems tend to become increasingly international. Input based on indigenous sources is insufficient for satisfying the multidisciplinary needs of scientists and engineers who look upon information as an international resource. As stated in the introduction to the UNISIST Feasibility Study "scientific information embodies the heritage of man's verified knowledge as well as the current records of his never-ceasing inquiries into truth... It is a cumulative resource; knowledge builds on knowledge as new findings are reported. It is an international resource, built painstakingly by scientists of all countries without regard to race, language, colour, religion or political persuasion. As it is built internationally, it is used internationally... It is a medium for the education of future scientists, and a principal reservoir of concepts and data to be drawn on for application to economic and technological development programmes".

Nevertheless, Ladies and Gentleman, we are fully conscious that access to exhaustive research data and information on scientific and technical current research meets with some problems. The issue of confidentiality is well known to all of us. Private companies are reluctant to divulge their research activities. Governmental research in many areas is of a highly confidential nature. A number of pressing needs have led governments to pay particular attention to the policy aspects of scientific and technical activities and to the fact that such policies cannot be intelligently formulated without access to relevant current R & D information. The data required for science policy decisions are of course of "intimate" character and are often not readily available for international exchange.

In spite of these and other problems, and the limitations of the situation, UNESCO can still contribute to the solution of some of the more technical aspects. For example, some papers presented at this symposium touch upon the issues of standardization, compatibility and interconnexion, and the need for guidelines. This is an area where UNISIST can help.

You have received this morning, for example, a copy of the "UNISIST Guidelines on the Conduct of a National Inventory of Current Research and Development Projects". Even though these Guidelines are not presented in any great detail, Professor NEELAMEGHAN in his paper will present the results of a comparative study and discuss some aspects of these guidelines.

May we also note here that UNESCO has set up a system called ISORID for the collection and dissemination of information on ongoing research in documentation. This system is not being presented to you since we shall concentrate on science and technology, but relevant literature on the system will be available at the Reception.

Ladies and Gentlemen, the symposium programme has been structured in such a manner as to provide information and stimulate discussion on the following major themes, as indicated in the programme:

1. Existing and emerging information systems: problems of development and operation;

2. Meeting user needs: current services and future possibilities;

3. International exchange: its value and mechanisms for its accomplishment.

In looking at the programme, we can see that a substantial number of papers are being presented by representatives from the developing countries.

It is gratifying to realise the keen interest they show in this subject.This of course comes as no surprise to us; much attention is being paid these days to the subject of better management of countries' technological resources. Technology transfer and technological innovation represent two interrelated but distinct aspects of the overall subject. It has been said recently that the importance of technology transfer lies in its ability to stimulate and strengthen the innovation process. The role of information on current R and D in this area of particular interest to the developing countries cannot be overemphasized.

May I conclude my remarks by recalling that the seventh special session of the UN General Assembly of last month /September 75/ in discussing "Development and International Economic Co-operation",underlined that: "Developed countries should facilitate access of developing countries on favourable terms and conditions, and on an urgent basis, ... to relevant information on advanced and other technologies suited to their specific needs as well as on new uses of existing technology, new developments, and possibilities of adapting them to local needs".

The subject of our deliberations during these three days constitutes a practical way of implementing the recommendations of the UN General Assembly. Our deliberations during this symposium can contribute towards improved international economic co-operation in response to the pleas made by the UN. It is therefore with the highest hopes, that, on behalf of the Director General, I ask you to accept my warmest wishes for the success of your work.

M.L. MALAVARD,
Président,
Bureau national de l'information
scientifique et technique /BNIST/,
France

Session 1

Paper 2

DEFINITION D'UNE POLITIQUE DE RECHERCHES SCIENTIFIQUE ET TECHNIQUE - ROLE DES INVENTAIRES DE PROJETS DE RECHERCHES EN COURS

Monsieur le Président, Mesdames, Messieurs.

L'accord paraît aujourd'hui unanime pour estimer que l'"information sur les recherches en cours" constitue un support indispensable à certaines des actions que doivent conduire aussi bien les responsables de la politique et les administrateurs de la recherche et du développement, que les scientifiques et les chercheurs eux-mêmes.

Mes fonctions actuelle de professeur d'université et de directeur de laboratoires pourraient m'inciter à vous parler de ce second volet, mais il vous paraîtra bien préférable que je laisse à mon éminent collègue le Prof. E.WESTRUM le soin de traiter, avec son exceptionnelle compétence, cet important sujet.

Vous comprendrez donc que je me limiterai ici au premier volet: celui de l'information sur les recherches en cours au service de la politique scientifique. C'est un témoignage que je voudrais vous apporter car en un moment de ma carrière j'ai, en effet, été confronté à divers problèmes de la recherche et du developpement, tant comme Directeur des Recherches au Ministère de la Défense que comme membre et président d'un Comité Consultatif de la Recherche Scientifique et Technique, placé, en France, auprès de la Délégation à la Recherche et chargé, par le gouvernement, de présenter des recommandations pour l'élaboration de sa politique de recherche et de développement.

L'élaboration d'une politique de recherche et de développement comporte diverses phases; j'en donnerai un bref aperçu, nécessairement très imparfait et très incomplet:

Il est d'abord nécessaire de recueillir d'indispensables données. - La première de celles-ci doit permettre de posséder une vue aussi complète que possible de l'état des connaissances, passées certes, mais surtout présentes et ceci pour tous les domaines de la recherche et du développement.

Il faut ensuite connaître l'état des recherches en cours dans l'ensemble du monde scientifique et technique en vue de déceler:

les buts poursuivis par les chercheurs,

les résultats escomptés par ces recherches,

les probabilités de succès de ces recherches,

les délais probables d'obtention de résultats positifs ainsi que les faits porteurs d'avenir,

enfin les chances de nouvelles découvertes, susceptibles de provoquer d'importantes mutations dans un domaine considéré.

Ces premières données peuvent servir déjà pour des études de futurologie concrète, je préfère dire de "Prospective", car il s'agit pour ceux qui en sont chargés, non pas de prévoir passivement un avenir plus ou moins in-certain - vous savez d'ailleurs combien les scientifiques répugnent à se livrer à ce genre d'exercice - mais, au contraire, en adoptant une attitude active envers le futur, de s'efforcer, dans les vues perspectives que l'on peut avoir sur l'évolution de la science et de la technique, de privilégier certains aspects de cette évolution pour dégager les actions à entreprendre afin de rendre probable ce qui paraît possible pour l'interêt national et international et le bien de l'humanité.

Cette approche, encore très en amont d'une définition précise d'une politique de recherches est effectuée,suivant les circonstances et les nations, soit de manière continue soit périodiquement. Elle est un guide précieux dans l'établissement de plans à long terme, elle sert encore pour les plans à court terme. Comme on peut en juger, elle doit faire un large appel à toutes les informations sur les recherches en cours.

Pour les autres phases d'élaboration d'une politique de recherche, les inventaires de recherches et projets de recherches en cours présentent un intérêt à la fois sur le plan national et sur le plan international.

Sur le plan national tout d'abord, il est nécessaire, pour définir une politique cohérente de la recherche, de mesurer avec précision l'effort de recherche dans un domaine déterminé: c'est l'évaluation dans ce domaine du potentiel national. Ceci suppose de connaître, dans chaque spécialité, les moyens disponibles - moyens en personnel, c'est-à-dire les responsables des projets, le nombre des chercheurs, la constitution des équipes, les organismes auxquels ils appartiennent - moyens matériels ensuite: instruments et équipements scientifiques des laboratoires, montant et source de financement de chaque projet. Il faut encore avoir une idée de la qualité scientifique des équipes et les situer sur le plan international par leur notoriété scientifique, les références à leurs publications, etc.

Ainsi devient-il possible d'apprécier si l'effort de recherche dans un domaine donné est suffisant, si cet effort doit être renforcé et dans quelle direction.

Par une synthèse appropriée de ces informations on peut, en effet, dégager certains axes d'effort d'une politique de recherche et modifier, si nécessaire, cette politique en conséquence.

Un des moyens, souvent utilisé, pour renforcer un effort de recherche consiste à lancer un appel d'offres sur un certain nombre de thèmes. L'exploitation rationnelle d'un inventaire de projets de recherche facilite la définition de ces thèmes et permet de situer les équipes les plus aptes à répondre à de tels appels d'offres. En l'absence d'information sur les recherches en cours,la tendance est de choisir les laboratoires ou équipes d'après leur étiquette, le titre du laboratoire par exemple, alors que l'évolution des travaux scientifiques est telle que l'interpénétration des disciplines est de plus en plus courante et que des chercheurs deviennent souvent et rapidement des experts sur des sujets hors du domaine dans lequel ils ont été antérieurement classés.

Un autre aspect de la politique scientifique consiste à coordonner les activités de recherche entre organismes dont les centres d'intérêt se recouvrent et à éviter que des recherches soient effectuées en double.Cette coordination peut être facilitée par les renseignements recueillis dans les inventaires des projets en cours et permet, éventuellement, d'alerter les équipes de chercheurs travaillant sur des sujets voisins ou complémentaires.

Les besoins d'informations sur les études en cours sont devenus particulièrement cruciaux quand il s'est agi, partout dans le monde, du lancement de programmes pluridisciplinaires. Pour les responsables de la politique scientifique il ne pouvait plus être question de consulter directement des spécialistes avant de connaître la nature de la contribution qu'ils pouvaient apporter: dans un premier stade un spécialiste ne songe qu'à avantager sa spécialité. En matière de pluridisciplinarité les recherches sont initialement éparpillées entre différents organismes, équipes au laboratoires, il est donc indispensable, comme préalable à toute élaboration d'un programme de recherches, de rassembler les données permettant d'avoir une vue suffisamment claire de la situation. On a pu voir ces dernières années l'immense quête de renseignements qu'il a fallu pour préciser les programmes de recherches en matière d'environnement, d'énergie, de biomécanique, de robotique médicale, etc.

Au niveau des administrateurs de la recherche, ainsi qu'à celui des directeurs des organismes et centres de recherches, ces inventaires sont encore très utiles pour l'établissement des budgets de recherches: ils fournissent de nombreux renseignements pour chiffrer le coût d'un projet, pour situer son intérêt par rapport aux autres activités de l'organisme, pour évaluer le temps nécessaire à son accomplissement et, en définitive,pour établir les choix et fixer les priorités, toujours nécessaires dans l'établissement d'un programme où doivent apparaître les besoins pour sa réalisation et, donc,les crédits correspondants.

Enfin quand il s'agit de recherches appliquées et de développements,les inventaires de recherches en cours permettent encore d'assurer une meilleure concertation avec les secteurs industriels concernés. Les discussions avec les responsables de tels secteurs, discussions basées sur la connaissance des projets, permettent de préparer un terrain favorable aux applications industrielles des résultats de la recherche. Ces échanges de vues donnent aussi aux milieux professionnels la possibilité d'exprimer des souhaits sur la conduite des recherches et même parfois sur une réorientation d'un programme.

Sur le plan international l'intérêt des inventaires de recherches en cours est tout aussi manifeste.

La connaissance des activités nationales de recherche et développement est un instrument indispensable pour l'administration des relations scientifiques internationales; il faut aussi connaître l'effort de recherche effectué dans les autres pays. Des renseignements détaillés sont nécessaires quand il s'agit, pour un secteur déterminé, d'établir une coopération. Il faut savoir choisir les domaines où cette coopération peut être la plus fructueuse, les intérêts communs, les possibilités que peuvent offrir les partenaires. On comprend, du point de vue pratique, combien il peut être important de situer rapidement les laboratoires et les équipes avec lesquels cette coopération pourra se développer.

Enfin, vous n'ignorez pas que l'un des soucis majeurs des responsables de la politique de recherche est celui d'obtenir les crédits nécessaires à la réalisation de cette politique. A cet égard les inventaires des projets de recherches en cours sont particulièrement précieux, ils permettent d'établir des comparaisons avec l'étranger, ils permettent aussi de mieux cerner l'évaluation financière de tel ou tel projet, ils fournissent surtout de solides arguments pour convaincre les Autorités Gouvernementales du bien fondé des demandes budgétaires nécessaires à la réalisation du programme national.

J'espère, par ces breves réflexions, avoir suffisamment souligné l'importance que présente, pour les responsables de la politique scientifique, l'information sur les recherches en cours.

Je me réjouis qu'un Colloque International consacré à ce thème s'ouvre aujourd'hui dans le cadre de l'UNESCO.

Je formule le souhait que par l'échange d'expériences qui en résultera, les spécialistes arrivent à perfectionner leurs systèmes de telle sorte que ces systèmes soient toujours plus utiles, plus accessibles, plus économiques et, rendent ainsi les meilleurs services aux responsables de la politique scientifique de chacun de nos pays.

E.F. WESTRUM, Jr.
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International Council of Scientific Unions,
Committee on Data for Science and Technology
USA

Session I

Paper 3

INTERNATIONAL PERSPECTIVES AND PROBLEMS FOR INFORMATION SYSTEMS FOR ONGOING RESEARCH IN SCIENCE

It is both an honor and a pleasure for me to be here at the invitation of and in place of the Secretary General of the International Council of Scientific Unions /ICSU/. My role - as I understand it - is in part one of representing the interests and concerns of the International Council of Scientific Unions and its various union members, scientific associates, programs, and services in the present problems of providing current information on research in progress on a truly international scale.

My own international scientific involvement and base of reference has been largely with CODATA - an acronym standing for Committee on Data for Science and Technology. CODATA is a relatively young ICSU committee established as recently as 1966 to promote and encourage on a worldwide basis the production and distribution of collections of critically selected numerical and other quantitatively expressed values of properties for substances of importance to science and technology. Initially its endeavors were focused on chemistry and physics; however, its scope has been broadened to include also non-numerical data and time and place dependent data as well. It now embraces the biological and the astro-geosciences and is especially concerned with data of interdisciplinary significance.

Practically speaking, this means that CODATA is concerned with fundamental constants, with key values for thermodynamics, with computer use, with improving the presentation of data in the primary literature, with enhancing the ease of retrievability of data from either the primary or the secondary literature, and in encouraging the generation of compilations of critically evaluated data. But its concern is broader and involves many aspects of information - particularly where these bear on data per se - and, like UNISIST, it is concerned with the accessibility and dissemination of data itself. In another sense, CODATA is interested in achieving a "compression" of the scientific literature to make conveniently accessible the most reliable values of data presently known. In short, it concerns itself with the conditions and constraints which have to do with the production and effective utilization of data. For these reasons, I am pleased to be here today to find out to what extent your concerns, my concerns, and our concerns about ongoing research bear on the maximal worldwide utilization of its scientific manpower.

Early recognition of information's crucial role in research has been credited to Dr. V. BUSH who served as the wartime director of the American Office of Scientific Research and Development /OSRD/ and who prophesied that science's coming crisis would neither be one of support nor one of organization, but of communication. Although scientific knowledge is being expanded at a prodigious rate, "...the means we use for treading through the consequent maze for the momentarily important items..." has not been modernized /1/.

I assume that we may consider it self-evident that scientists in their several roles as research designers, administrators and/or managers, implementors, and generators of data - and also of information about research - have both a need for and responsibilities toward the development of information systems on research in progress. Not only do individual scientists wear many hats on occasion, but there are many kinds and types of scientists practicing one discipline or another, having a position somewhere between that of a student, a junior researcher, a senior researcher, or even a research director, and existing in a particular setting. Researchers process information differently and researchers of diverse types obviously have varied information needs. Indeed, any researcher in one phase or another of a research endeavor will experience variations in the nature and intensity of his informational needs.

For these reasons, I would like to emphasize that the perception by scientists of their informational needs on ongoing research, and of their responsibilities thereto is affected by these several factors, i.e. by their discipline, position, status, and setting, etc. /2/.

There is obviously still another relevant factor which - for want of a better term - is "centrality". This refers to the researcher's proximity to centers where the most important research in his specialty is being conducted. It is both a matter of geographical as well as one of psychological proximity, for the problem can be circumvented by many peripheral "short circuits" /e.g. telephone contacts, correspondence, exchange of each other's graduates, preprints, etc./ by which a measure of centrality can be achieved. One might well imagine that a scientist in a developing country might feel reasonably isolated from the kind of centrality that I am describing.

Since the overall problems of nature, content, format, and even user needs are certainly not all to be solved in the course of a brief lecture, I should like to focus my attention on researchers who are operating essentially independently or individually whether they are working in a university setting, a non-profit institute, a profit-making organization, or a government facility. In a typical university it is not unusual that there be only a single individual doing research in a specialized area - except, of course, in those situations in which there is an institute or a center which involves a number of scientist peers doing substantially related research. High-level management of research projects of large research teams involves information and decision problems on a different scale and of a different type, and is being considered by others during the present symposium. For example, Monsieur MALAVARD /3/ has already commented on the management problem and Dr. HERSEY /4/ will shortly delineate aspects of the impressive Smithsonian Science Information Exchange designed particularly with such needs in mind.

So for the moment at least let's concern ourselves with the scientific research "proletariat". How does an individual scientist - let us postulate one in a developing country - maintain contact with what is going on in the busy, ever-changing field of science, particularly as it affects his own research? During the course of the last few months, I have had the opportunity to discuss this problem with individuals from Eastern, Mid-Eastern, African, and isolated centers and the responses have been rather similar. Their modus operandi involves:

1. **perusal of the literature**
2. **participation in conferences abroad, and**
3. **contacts with scientific consultants and visiting lecturers in their own disciplines.**

I have not yet to meet one who claims to have utilized information systems on ongoing research /5/..

But is this really adequate to his needs? Is this enough information to prevent him from performing research which may have already been done elsewhere, which may no longer be meaningful, or which may in fact involve a "technology trap" /6/ of one sort or another? An author may wait months before submitting a scientific work to a primary journal,the editor and printer may require five to eight months to publication, and the mails may take one to three months more. Moreover, if the secondary literature /the abstracts/ are to be consulted in locating the article, additional months will be lost. Perhaps this is the best that is available to these individuals; hopefully, in areas of science in which the pace of research activity is not too furious it may be adequate. On the other hand, it would seem evident that better mechanisms of bridging the information chasm are clearly desiderata.

In this connection there are several ICSU programs which might be of interest to participants in the symposium. All of them do, of course, involve a particular limited area of research and a mutually interested group of collaborating institutions, but the documentation provided none the less may enjoy rather widespread dissemination to laboratories and groups about the world. For example, the International Magnetospheric Study /IMS/ initiated by the Special Committee on Solar Terrestrial Physics is such an undertaking. It is a concerted program to study the magnetosphere by coordinated observations of satellites, aircraft, balloons, and ground-based stations. NASA provides investigators with projected satellite orbits for about twenty satellites of interest. Data from satellite sensors, investigators, etc. are made available through the ICSU-coordinated World Data Centers /WDC's/.

Another ICSU program, the International Biological Program /IBP/ conducted from 1964 through 1974 involved intercommunication between several hundred contributing projects. /Interestingly enough, productive collaboration was impossible here until international intercompatibility of methods in biology were devised by IBP and subsequently published in over twenty volumes. Some of these methods have found widespread acceptance outside of IBP./

In addition, some of the ICSU Unions compile directories of ongoing activity within their fields of competence. Thus, the International Mathematical Union publishes a directory of mathematicians every three years; the International Astronomical Union, through its Assembly and Symposium, keeps the world's astronomers aware of ongoing research and research plans. The International Union of Crystallography likewise provides comparable communications as well as International Tables, Structure Reports, etc.

In addition to these rather broadly based endeavors, I should like to call your attention to another enterprise which fills a need in a particular area. You will excuse me for using as an example - possibly a unique example - from an area in which I may claim some scientific competence,that of chemical thermodynamics. You may feel that thermodynamics respresents a very narrow sprectrum of all of the world scientists and I would not argue the point. However, whereas a few years ago the great bulk of chemical thermodynamic data were produced - and in turn often used - by essentially professional thermodynamicists. At the present time, with the availability of commercial calorimeters and other instruments - thermodynamic data are often produced by various users of data whether they be solid-state physicists, biologically-inclined chemists, or practitioners of other disciplines rather than by professional thermodynamicists. Utilization of thermodynamic data is likewise multidisciplinary in nature.

For approximately 18 years now the Commission on Thermodynamics and Thermochemistry of the International Union of Pure and Applied Chemistry /IUPAC/ has produced annually The Bulletin of Thermodynamics and Thermochemistry /7/.This document - produced to a large extent by contributed, unreimbursed, voluntary scientific endeavor under the editorship of your speaker - brings terse research abstracts of general ongoing research in between 400 and 500 laboratories around the world and, in addition to this, it provides specific abstracts on research completed but still unpublished /including papers submitted to journals but not yet in print/. These terse abstracts ranging from Los Alamos, New Mexico to Novosibirsk, USSR, are classified into five main categories. By deliberate intent, no actual data are presented and the presentation concerns itself with answering the question. "Who has determined what properties or information on what compound over what range of variables and where?" Another function of this document is to provide bibliographies of some 6000 or so papers of chemical thermodynamic concern published during the year. The coverage includes data not only on pure materials but on systems and mixtures, on apparatus and techniques, and on correlations and critical tabulations. Moreover, titles of new thermodynamic books /about 180 per annum/, special reports of key committees, and announcements concerning urgently needed data, international meetings, etc. are incorporated. For the convenience of the researcher, these impressive arrays of recent progress are carefully compiled and indexed by substance and/or formula.

Nearly 700 pages of photo-reduced copy are required each year. At a price of $ 12,00 per issue this document is a bargain and hopefully within the range of investigators throughout the world. Complimentary copies are provided to responsible investigators who cannot obtain the dollar exchange for purchase. Moreover, it is sold in local currencies in several nations as a convenience. This Bulletin helps to keep the individual researcher advised of ongoing research elsewhere, to avoid unnecessary duplication of measurements, and to obtain unpublished data. It can be regarded as a "zeroth order" critical table. Certainly, it is a first step in the production of the ultimate critical table as well as a disciplinary aid in information on ongoing research.

So valuable to the thermodynamics - and to the science and technology - community has the Bulletin proven that it is surprising that it has not been imitated more widely in other disciplines. However, I continue to regard thermodynamics as a pioneering discipline and one which may be expected to point the way of progress for other disciplines.

Perhaps it is obvious that few - if indeed any - countries can afford to be actively involved in research in all fields of science. In commodity matters countries usually concentrate on developing certain items where they have a comparative advantage and import their other requirements. Yet there seems to be an obvious reluctance to adopt this approach in scientific research. Hence, developing countries often unnecessarily duplicate efforts in advanced scientific fields in which research and development rich countries excel to the detriment of failing to solve their own peculiar problems. Importation of the results of ongoing research may well be the first step in this process.

In continuing this line of reasoning - one might argue that international cooperation may be not only desirable for scientists in developing countries, it may be an essential endeavor. In the experimental aspects of science it may well require the pooling of resources of several nations to bring together the critical mass of funding and of technical personnel necessary for a given task /as in the full and effective utilization of a nuclear research reactor/. International research establishments for both scientific and technological disciplines would seem to provide significant benefits in information exchange as well as in the production of ongoing research itself. True, pooling of resources would, of course, encounter language barriers and national rivalries but surely there are blocs and groups of countries where this approach might bear real fruit in terms of research productivity and ongoing-research-information exchange. While many cultural activities are legitimately national in scope, science is by its very nature international.

If I understand correctly, fellow scientists and information specialists, the reason that we are here for these three days is to suggest and/or develop better mechanisms whereby these goals can be achieved at least for ongoing research. Certainly, further support needs to be given to the exploration of mechanisms, contents, and formats for insuring effective interchange of information on ongoing research among scientists as well as at higher management levels. But we must not fail to recognize that as important as are the printed page, the microform technique,or computer-based systems and services may be, they will not enable the scientific researcher to avoid the pitfalls of "fashions in science", of technology traps, or of related decisions concerning his own experimentation, but should enable him - at least in part - to monitor new advances in a subject area, avoid needless duplication, and to feel /and in fact to be/ less isolated. But at the same time we need to recognize the key importance of informal systems of information exchange, of which international personal contacts and oral communication are an increasingly vital part in providing stimulating, morale-building links with international science and technology.

The problem of ongoing research cannot be resolved simply by increasing the information resources in the hands of scientists in developing countries /8/. No amount of journal-type scientific literature and computer-assisted searching is going to replace the need for these men to have international personal contacts /9, 10/. They are going to need to go to meetings in other countries /11/, to have informal talks with other scientists /12/, and to be able to invite scientists from other nations in as visitors, consultants, or resource persons /13, 14/.

When scientists meet, typically they exchange "utilities" /i.e. information transferable both ways/ in one way or another and there is a joint reward of mutual stimulation. Occasionally there is a slightly different exchange: you give me information stimulation; I admire and praise what you know. A problem for scientists from the developing countries is that they often have to exchange in the second style of interchange if they interact largely with those from the developed countries. On the other hand, in interaction with other scientists from a situation similar to their own, they can engage in a more balanced exchange. Hence, institutions which promote inter-developing country contacts between scientists will simultaneously a/ help control the "brain drain", b/ provide other scientists with whom those from developing countries can collaborate on equal terms, and c/ provide mutual stimulation which may often be lacking within a single nation.

The International Centre for Theoretical Physics in Trieste /15/ is an institution which apparently has had an unusual efficacy in providing a permanent meeting place for young scientists in this /non-laboratory/ discipline, an opportunity to update their knowledge, and find new inspiration and stimulation for their own research programs back home. Certainly this endeavor - which might well be imitated elsewhere - aids in decreasing the isolation of scientists in regions remote from centrality /i.e. "where the action is"/.

In this era of interdisciplinary endeavors, experimentation in improving information transfer between scientists of different disciplines is also urgent and any truly successful system of formal exchange of information will provide such cross-fertilization with potentially creative ideas in addition to the more distinctly disciplinary-types of information. We may expect that the discussed endeavors - both formal and informal - undertaken in sufficient measure will provide better international mechanisms for identifying, delineating, and disseminating information on current research work, will aid in breaking communication barriers, will enhance cooperation between countries, and will lead ultimately to greater and more fruitful international cooperation in research - and in the production of reliable scientific data.

In conclusion, I would like to make a further brief comment on the responsibilities of the scientists themselves with respect to the development and implementation of information systems on ongoing research.

In order to reap the user benefits of such systems, the scientists must, in exchange, frequently provide efficient, considered descriptions of their own studies. This activity should be regarded an integral part of any research effort /16/ much the same as the application of error theory in the optimum design of experiments. Meaningful input, rather than a perfunctory gesture in response to informational/documentational requirements, is an obligatory condition for eventual user benefits.

Scientists in developing countries should find the rewards of such participation in their own inter-developing-country systems especially high since a greater portion of the applied problems under study will be pertinent to their social/economic environment - higher than may normally be expected from systems devised for more advanced technologies.

REFERENCES

1. BUSH, V. As We May Think. Atlantic Monthly. July 1945.

2. PAISLEY, W. Library and Information Service Needs of the Nation. In: Proceedings of the 1973 Conference on the Needs of Occupational, Ethnic, and Other Groups. Washington, D.C. 1974.

3. MALAVARD, M.L. Définition d'une politique de recherche scientifique et technique - rôle des inventaires de projets de recherches en cours. In: this volume p. 23-25.

4. HERSEY, D.F. Ongoing Research Information Systems and their Future Development. In: this volume p. 33-36. Cf. also: HERSEY, D.F. Society and the Research Dollar. J. Wash. Acad. Sci. 60, 1975, p. 10-15.; and HERSEY, D.F., FOSTER, W.R. and LIEBMAN, S. The Smithsonian Science Information Exchange. Chemical Technology. 3, 1973, p. 733-738.

5. It is a pleasure to acknowledge interviews generously granted by scientists from developing countries as well as research and insights provided by Professor R.M. WESTRUM, Department of Sociology, Eastern Michigan University, Ypsilanti, Michigan, in the formulation of this presentation.

6. Cf. especially The Research System. Vol. 3, 1975, Organization for Economic Development, Publications Center, Suite 1207, 1750 Pennsylvania Ave. NW, Washington, D.C. 20006.

7. WESTRUM, E.F., Jr., Editor, The Bulletin of Thermodynamics and Thermochemistry, Michigan 48106, Publications Distribution Service, University of Michigan, Ann Arbor.

8. SUTTMEIER, R.P. Research and Revolution, /Science Policy and Societal Change in China, Lexington /Heath/, Massachusetts, USA. 1974.

9. MORAVCSIK, M.J. Technical Assistance and Fundamental Research in Underdeveloped Countries. Minerva, 2, 1964, p. 197-209.

10. ODHIAMBO, T.R. International Cooperation in the Social and Life Sciences, presented at the Committee on Science and Astronautics, US. House of Representatives, January 1971, TC/SIO/4, NTIS, Washington, DC;He stated: "One of the most intractable problems of the scientific community in developing countries is the feeling of intellectual isolation and its twin, isolationism. Professionally qualified scientists in any one field are few and far between; they rarely visit each other's laboratories; there are few high-calibre scientific societies where one can test out his intellectual muscles before his peers; funds are extremely hard to come by for visiting advanced laboratories abroad where one can both explain one's research work and derive new sustenance in one's special field; and as soon as one shows unusual potential as a scientist, he is pushed on to doing unproductive work - administration, committee work, etc. No wonder many scientists in developing countries eventually assume an isolationist trend: they fear, perhaps unconsciously, to expose to the world any inadequacy in their scientific achievement. The solution - or one of the solutions - to this mammoth problem is to mount a fundamental attack on the impedimentia on the way to the maintenance of prolonged contact between promising young scientists in developing countries and the best research work going on in the whole world, including that in the developing countries themselves."

11. DHAR, M.L. Attitudes of Research Scientists in Science in India's Future, Press Institute of India, 1969, Vikus Publications, India, states: "... Further, even reasonably good scientists, who have performed well in scientifically advanced countries, tend to lapse into relative quietude in a developing economy. Continued isolation of a scientist from others with whom he may converse in his own language tends to draw him away from the mainstream of his scientific interest in the course of time. Instead of becoming a part of the dynamic stream, he runs the course of an isolated tributary, and so does his attitudes toward science."

12. OZINONU, A.K. Pattern of Scientific Development in Turkey 1933-1966. In: NADER, C. and ZAHLAN, A.B. /ed./. Science and Technology in Developing Countries. Cambridge, Univ. Press, 1969; In response to questions he asserted, "... scientific papers published in Turkey have not kept pace with the increase in the number of scientists ... scientists who go abroad frequently publish more papers; scientists who stay abroad publish even more."

13. Cf. NADER, C. Technical Experts in Developing Countries. In: NADER, C. and ZAHLAN, A.B. /ed./. Science and Technology in Developing Countries, Cambridge, Univ. Press, 1969.

14. MORAVCSIK, M.J. Some Practical Suggestions for the Improvement of Science in Developing Countries. Minerva, 4, 1966, p. 381-390.

15. ZIMAN, J. Centre for the Practice of Theory /Review after a decade/. Nature. 248, 1974, p. 270-271. Cf. also SALAM, A. Interaction at Trieste, New Scientist, 2, Dec. 1965, p. 672-674. and SALAM, A. International Center for Theoretical Physics, Trieste. In: International Cooperation in the Physical Sciences presented at the Committee on Science and Astronautics, NTIS. Washington, D.C. U.S. House of Representatives, Jan. 1971, TC/SIO/6.

16. WESLEY-TANASKOVIČ, I. Personal communication. October 1975.

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Session I
Paper 4

ONGOING RESEARCH INFORMATION SYSTEMS AND THEIR FUTURE DEVELOPMENT

Since man first began to write and record his observations, information has played a major role in the march of progress throughout the centuries. Research and development particularly have profited from the many data bases and information systems which have developed over the years. Today, research investigators, managers and science policy makers find themselves surrounded by a myriad of technical information systems and services from which to choose. The problem in many cases is one of deciding where to go to obtain the information necessary to help in their decision-making process. It is not my intent here to discuss the growth and development of the information field in general, since many others have already dealt in great detail with this subject. I plan rather to talk about one specific facet of the information field and more specifically, to discuss the purpose of the current symposium and what we hope will be accomplished by it.

There was a time many years ago when a specialist in a given field could say with reasonable certainty that he knew most of his colleagues personally and what they were doing. However, with the expansion of scientific endeavors, research projects became more complex, and investigators with a diversity of training and background began to work together. The study of poliomyelitis, for example, was no longer just a problem for physicians but now involved specialists with such diverse backgrounds as genetics,biochemistry, biophysics, and immunology. As a result, new names entered each field of research and a personal knowledge of every individual investigator and his research was no longer practical. Governments found it necessary to expand research in everbroadening fields such as aerospace and the environment, and as each new field developed it brought with it more investigators and more results. Today it is no longer safe to assume that all research on a subject such as energy or the environment is supported or performed within a single organization in a country. In point of fact it is usually carried out by many, and it was in order to plan and manage such major programs with a minimum of unwarranted duplication that information systems such as my own were developed some 26 years ago. Since then, many countries have begun to develop systems designed to identify research in progress not only on specific subjects but at broader interdisciplinary levels as well.

The diffusion of science and technology has not been limited by geographical boundaries. As development accelerated and communication improved between countries, it became apparent that the problems in one country were not dissimilar to those in others. So began the evolution of information exchange between them. Until now, the exchange has been primarily in the area of bibliographic information.

The successful development of organizations such as the International Nuclear Information Service stands as a model for what can be done on an international basis when a need exists. But what can be said about the development of ongoing research information systems and the possibilities of exchange in this field?

As we listen to the papers and discussions over the next three days it behooves us to keep in mind what we should do in the future, not just tomorrow or next year but in the years ahead. As a part of that future, one can envision telecommunication networks between ongoing research information systems within countries, between countries and even between multinational centers such as those being developed in the European Community and CMEA member countries. One might look forward to the time when language barrier might be solved through computer translation at only moderate cost. Part of the technology now exists for much of this to take place, but it will take the dedicated effort of people and countries to make it happen. Most of all it will require a sharing of technology and expertise to see that those countries which need technical advice and assistance can obtain it from those who have developed such knowledge and information. Basic to obtaining these goals, however, must be an awareness of where we are today, an identification of current problems and then a careful analysis of how we might progress into the future.

This first international symposium will mark a milestone in the information field. We are indebted to UNISIST and UNESCO for making it possible. It is particularly gratifying to one who has been associated with both research and the field of information science to note the increasing interest which has developed over the past few years regarding the use and importance of ongoing research information, not only to research managers and policy-makers, but to the research investigator as well.

It is common knowledge that access to information on research in all its forms has become increasingly important in every field. It is interesting to note that not only has the quantity of information increased significantly over the years, but its availability and the mechanisms for its dissemation have been significantly improved.

The increasing interest in and development of ongoing research information systems throughout the world should not be viewed as a desire on the part of the developers of such systems to have them replace existing information services. They should be viewed, rather, as an adjunct to other information services, designed to complement them and to fill the hiatus between the period when a research project begins and the first technical reports or publications appear. These information systems are a means of recognizing and coping with the fact that the state-of-the-art in any field is actually changing and advancing at the very time we are talking about it or writing about it. They are also, as we shall hear over the next several days, designed to provide information to research managers and policy makers which cannot be obtained economically or feasibly in any other way.

You may recall, in the first announcement made by UNISIST regarding this symposium, the purpose and aims of the meeting. I should like to reiterate these briefly, present an overview of the papers to be presented during the symposium, comment on the panel discussions and provide general background information, based on information submitted prior to the meeting, on the attendees and their reasons for attending the symposium.

The purposes of this symposium as originally envisioned were: first, to create a greater international understanding of the need for and uses of information on research in progress with a view toward narrowing the gap between developed and developing countries; second, to call attention to the methods used in operating systems for the collection, indexing, storage, retrieval and dissemination of such information for the benefit of organizations establishing new systems or seeking to improve existing ones; and third, to discuss the need for international exchange of ongoing research information, the problems associated with such exchange and, above all, to encourage the exchange of such information world-wide. It remains to be seen, at the end of this meeting and in the future, how successful we will be in meeting these objectives.

The program has been structured to cover descriptions of currently operating and proposed systems. In slecting papers for this purpose we have tried to obtain examples which would reflect both manual and computerized systems and those which illustrate a wide range of products and services. Many of the papers will highlight problems associated with establishing and operating these systems and the efforts employed to meet user needs. Papers will be presented describing systems which cover only the research efforts of a single organization within a country, systems developed to cover an entire national research program and systems designed to cover a major subject area on an international basis. You will hear about ways in which ongoing research information is collected and processed and the wide range of ways in which it is used. It is in this last area particularly that you will see major variations, sometimes within a single organization. There will be no question, I think, of the greater flexibility which exists in a computerized system over a manual one, but many of the computerized systems you will hear about developed from manual ones which at their inception had only a limited number of projects. You will also hear how a carefully designed manual system can develop, without interruption or extensive revision, into a fully computerized one.

One of the most interesting facets of the papers to be presented here is the wide variety of uses to which ongoing research information has been put. You will hear that it is used to describe national programs as well as in the preparation of technical bulletins in selected fields of research containing both national and international projects. It is sometimes used for the preparation of directories of expertise in various disciplines and sometimes as a measure of the level of effort in a particular field of research. The use of ongoing research information, as you will hear, is wide and varied. Behind it all lies a need either to know what potential users need and want before a system is developed, or to develop a system with sufficient flexibility to modify it if and when user needs change.

We have tried in the development of the program for this meeting to select speakers from all over the world. Their papers will illustrate the universality of a need for ongoing research information as well as what can be accomplished by a system, regardless of whether its budget is large or small, in meeting those needs. There are many other similar systems throughout the world, and I regret as Chairman that it was not possible for representatives of all such systems to make formal presenations during the meeting simply because of a limitation of time. We have, however, tried to provide time for discussion and hope that you will avail yourselves of this time to share with us the benefit of your own experience regarding the subjects to be discussed, including such questions as the level of indexing which is necessary, the technical background of indexers, the need for and use of abstracts versus titles and many other problems which, in the time available for this symposium, cannot be universally resolved.

You will hear over the next several days in the individual papers to be presented the approaches taken and the difficulties encountered in establishing and operating an information system of ongoing research. Although many of the problems vary from country to country, you will see that certain commonality exists and that the approaches which have been taken to solve these problems could prove useful for other systems. By hearing about the operational methods used in different countries and systems covering a wide spectrum, you may derive sufficient general information to enable you to follow up at a later date by personal communication with those speakers whose approaches most clearly meet your needs.

We have included in the symposium two panel sessions designed to emphasize and discuss what might be construed as common problems in /a/ the overall operation of ongoing systems and /b/ assessing and meeting user needs. The moderators of these two panels have been asked to develop representative questions believed to be of general interest and to solicit the response of panel members regarding their approaches to resolving them. To the extent that time permits, they will also solicit questions from attendees to which the panel members will respond.

At this point, I would like to say something about the individuals who have registered to attend the meeting and to comment on their reasons for attending. As of Friday afternoon there were 213 people who had preregistered for the sympsium. My remarks are based on those preregistering, since time did not allow me to analyse information on those who have registered this morning, although I do know that total registration as of 11:00 AM this morning was 160. It is interesting to note that about two-thirds of those attending indicated an interest in systems operations. This strong interest is further borne out by the fact that questionnaires were completed by an equal number of people who are responsible for or involved in the operation of an existing information system of ongoing research. Approximately half as many people indicated an interest in each of two other main areas, namely, science policy making and research management. In retrospect, it would appear that we may have balanced the program along appropriate lines to adequately represent the interests expressed, but it will be up to you, my colleagues, to inform us, if in fact we have succeeded in making this first international symposium a useful one and one which met your expectations.

I would like to make a few remarks with respect to the questionnaire which was sent out with the advance registration forms. We appreciate your taking the time to complete it and would like to ask if you have not already done so, could you please complete one before the meeting is over and give it to one of the UNISIST representatives at the registration desk. Of the initial 66 questionnaires which were returned, seven represented systems which are expected to be developed, 29 represented computerized systems in operation and 30 represented manual systems in operation. There were 18 systems which covered virtually all areas of science and technology and 41 which covered only specific areas of research such as agriculture, health-related fields or social sciences. I will have more to say about the use of the information obtained through these questionnaires in my closing remarks.

It is gratifying to note that representatives from around the world are present at the meeting, making it a truly international one. As one might expect our host country has maximum representation, but an impressive number of attendees from as far away as Japan, Korea and Latin America are with us. It is particularly worth noting that approximately 50% of the attendees are from developing countries. You will recall that one of the major purposes of this symposium was to narrow the gap existing between highly developed countries and less-developed ones insofar as identifying the need and use for ongoing research information and the ways in which various countries might respond to those needs. There are some individuals who I am sure will argue that developing countries have far greater needs than the establishment of a system for monitoring and identifying ongoing research. I do not feel I can adequately answer that question, but we will hear from a number of speakers during this meeting who I believe can and will speak on this question. My own personal feeling is that such a data base, if properly set up and maintained, can more than pay for itself by helping to better allocate scarce resources to the best possible use, and by serving as a means for showing that technical expertise does indeed exist in developing countries and that they can and should be given greater sources of support both from within and outside their country. The identification of research laboratories actively engaged in research, however limited because of national resources, should encourage monies from outside sources to support further research efforts, particularly in areas where environmental or epidemiological factors are ideal for the study of research problems whose solution could have a major impact on a large number of people. One must accept, I believe, the premise that research wherever it is carried out should ultimately lead to an overall benefit to mankind and an improvement in the quality of life.

I believe that it is the responsiblity of those who have experience and knowledge in any field to share it with those who have a desire to progress and grow. As PASTEUR once said, "It is characteristic of science and progress that they continually open new fields to our vision." It is my earnest hope that the papers and discussions which will take place over the next few days will serve as a major step in that direction, and that as the meeting proceeds you will let the UNISIST staff or myself know whether we are succeeding in meeting the objectives of this symposium so that out of it might come the ideas for where we should go from here. I see the symposium as only a first step in what I hope will be a continuing dialog for future growth and development in this important field of information, not only between a few countries but on a broader world-wide basis.

SESSION II

EXISTING AND EMERGING INFORMATION SYSTEMS: PROBLEMS OF DEVELOPMENT AND OPERATION

LES SYSTEMES ET SERVICES D'INFORMATION QUI EXISTENT DEJA OU SONT EN TRAIN DE SE CREER: PROBLEMES DE MISE EN PLACE ET DE FONCTIONNEMENT

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Session II

Part 1

Paper 5

Summary

ORGANIZATION OF THE NATIONAL INFORMATION SYSTEM IN ONGOING RESEARCH AND DEVELOPMENT IN THE USSR: EXPERIENCE AND PROSPECTS

Unpublished sources are known to be gaining more and more importance in information on current R & D. These include plans of research done by the scientific research organizations, report on R & D, technological documentation for R & D, dissertations for scientific degrees, algorithms and programmes for computers. Such sources of information have particular meaning in the context of carrying out applied R & D, mastering the production of new output and getting familiar with a new technological process in industry.

The use of such documents is very difficult because of their difficult accessibility. Often a specialist has no idea of what has been done by other institutions, and is not aware of the reports of projects that have been completed, because they are not in circulation. That is why it was indispensable to create specialized information centers to collect and disseminate information and R & D based on unpublished sources.

Since 1968 such functions in the USSR have been carried out by All-Union Centre for information on science and technology /VNTIC/, which is accumulating information on fundamental and applied R & D in all fields of science. One can find there all the accumulated information about such work, from the moment a project has been input into the plan of a scientific institution up to the moment of completion.

The information which is in the files of VNTIC is published in subject-oriented and problem-oriented bulletins. On request from institutions and organizations, a retrospective subject search can be done, as well as the making of hard copies and microfilms from dissertations and reports; we also provide statistical processing of factual information on ongoing projects and their executors.

The processing of information, searching, processing of requests for the copies, preparation work for publishing, and also the statistical processing of the data are done by the complex automated system ASINIT /Automated System for Information in Science and Technology/.

Ways to improve and develop such an information system are being considered.

Résumé

ORGANISATION DU SYSTEME NATIONAL D'INFORMATION SUR LES TRAVAUX DE R & D EN COURS EN URSS: EXPERIENCE ACQUISE ET PERSPECTIVES D'AVENIR

La documentation non publiée est, on le sait, une source d'information qui prend une importance croissante pour qui veut se renseigner sur les travaux de R & D en cours. Cette documentation englobe les plans de recherche établis par les organismes de recherche scientifique, les rapports sur les travaux de R & D, la documentation technologique pour ces travaux, les thèses, les algorithmes et les programmes d'ordinateur. Ces sources d'information sont particulièrement importantes pour ceux qui font de la recherche appliquée et qui souhaitent maîtriser une production nouvelle et se familiariser avec un nouveau procédé technologique dans l'industrie.

Il est bien malaisé d'utiliser ces documents parce qu'ils sont difficilement accessible: souvent le spécialiste n'a aucune idée des travaux des autres institutions et ne sait pas que tel ou tel compte-rendu de projet est terminé parce qu'il n'a pas été diffusé.C'est pourquoi il est indispensable de créer des centres d'information spécialisés qui rassemblent et diffusent des renseignements sur les travaux de R et D en se fondant sur des documents non publiés.

Depuis 1968,cette tâche est assurée en URSS par l'Institut central d'information scientifique et technique /VNTIC/ qui recueille des données sur les travaux de recherche et de mise au point fondamentales et appliquées dans tous les domaines de la science. Il est possible d'y trouver toute l'information recueillie sur ces travaux depuis le moment où les projets on été inscrits au plan des institutions scientifiques jusqu'à celui de leur achèvement.

La documentation contenue dans les archives de VNTIC est publiée dans des bulletins axés sur l'étude de sujets ou de problèmes particuliers. A demande d'institutions ou d'organisation, l'Institut peut entreprendre des recherches retrospectives sur un sujet donné ou reproduire des thèses ou des rapports sur support papier ou sur microfilm; il assure également le traitement statistique des données concrètes sur les projets en cours et leurs responsables.

Pour le traitement de l'information, la recherche documentaire, le traitement des demandes de copies, le travail préparatoire en vue de l'édition et le traitement statistique des données, on utilise le système automatisé complexe ASINIT /Système automatisé pour l'information scientifique et technique/.

On étudie actuellement les moyens d'améliorer et de développer ce système.

ORGANIZATION OF THE NATIONAL INFORMATION SYSTEM IN ONGOING RESEARCH AND DEVELOPMENT IN THE USSR: EXPERIENCE AND PROSPECTS[1]

V.S. MALOV

Both in the sphere of R&D and in the application of scientific and technological advances to industrial production, information shows itself as a resource just as important as scientific manpower, instruments and R&D funding. The quality of information services provided to R&D largely determines the effectiveness of the activities of scientific insitutions as well as the rate at which new science and technology is incorporated into industrial production. The two components of the effect to be taken into consideration are:

1. using the information on the results of R&D as a basis for further studies by the institution or industrial firm itself which has produced the results;

2. using the results obtained by others instead of doing their own research. In the former case, it reduces the time it takes to reach the final goal; in the latter case, it eliminates unproductive creative labor expenditure. Of great value is not only information on the results of completed R&D but also information on the subjects of research projects being newly started, for they make it possible for a research worker as well as for the manager of a research institution to more consciously define his plans of research and eliminate unjustified duplication of work being carried out at other institutions.

In this sense, it is useful to have available information on all the stages of a R&D project, beginning from the moment the idea was first conceived and put into the work plan of the scientific institution right up to the moment of the completion of the project.

Information on ongoing R&D is contained in numerous and varied sources. However, unpublished sources are gaining more and more importance especially in applied research and development, in mastering the production of new products and introducing new processes.

Among such sources which reflect the results obtained are primarily reports of R&D projects. Reports are written immediately after the completion of each significant stage of the work on the project and contain, as a rule, a detailed account of the main contents of the work, the experimental procedure used as well as conclusions and recommendations with respect to the continuation of the work and the practical utilization of the results obtained. Thus, reports are issued considerably ahead of information on research published in scientific journals and monographs. It should also be noted that the numbers of manuscripts pouring into the editorial offices of scientific

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/1/ This paper was presented by Mr. V.RYBATCHENKOV, UNESCO, who was for some years with the All-Union Centre for Scientific and Technical Information.

journals are growing greater and greater, and, as a result, a trend is observed toward longer and longer publication waiting time combined with the compression of the material published, whereby valuable information is inevitably lost.

The fact that project reports are not put into mass circulation makes access to them somewhat difficult especially because specialists are often unaware of the work completed at other organizations or of project reports and design documentation issued there. As for information on research projects being newly started, such information is generally not made public and spreads through non-official channels.

Thus, the natural desire of specialists to extend the use of unpublished sources comes up against considerable obstacles. That is why a demand arose for organizational steps which would facilitate access to unpublished sources of information on ongoing research and development. Toward this end, specialized information centers have been set up in a number of countries; each of these centers accumulates particular kinds of unpublished sources and widely distributes associated information.

Such centers are operating successfully and are developing.

Yet the experience in operating such centers in some foreign countries has shown that information that is being accumulated in their files does not cover all R&D carried out in these countries. Information on applied research and development in the private sector of the national economy is represented particularly poorly.

Patent right restrictions probably account for this phenomenon since issue of a report precedes the official registration of a patent for the invention. Individual industrial firms evidently possess more complete unpublished information with which they supply their institutes and their enterprises.

In the USSR and in the other socialist countries, the activities of scientific institutions and design- and development organization are directed by the state in accordance with the national scientific and technical policy. The resources of science and directions of R&D are placed under the overall national economy development plan. The results obtained belong to the state. Thus, the necessary prerequisites are created for a systems approach to the organization of information on ongoing R&D on a nation-wide scale, embracing all generators and all potential users of such information. To perform these tasks, the All-Union Scientific and Technical Information Center /VNTIC/ was created in the USSR in 1968.

VNTIC is responsible for 1/ pre-registration of all R&D projects: started at all research institutes, universites and colleges, design and development organizations as well as research laboratories of enterprises; and 2/ accumulation of information on the completed stages of research projects and their associated progress reports. Based on these materials, VNTIC is responsible for keeping scientific institutions and industrial enterprises of the country up-to-date.

Dissertations for scientific degrees being scientific documentes and containing, as a rule, valuable information on new results of research, are also collected.

Scientific institutions and universities are required by law to submit to VNTIC materials for registration of all new research projects as well as project reports and dissertations, irrespective of whether the R&D involved is commissioned by a ministry or an agency or whether it is performed at the organisation's own initiative. Similarly, no distinction is made between projects funded by the state from its budget and those financed by customer organizations. As for dissertations which result from individual intellectual efforts of individual scientists but are connected with their R&D work at their scientific institutions, they are automatically sent to VNTIC by the respective scientific councils following their presentation.

The so-called registration card containing brief information on the subject of the research project, the performer and the scheduled date of fulfillment of the work is the document used for registration of newly started projects.

A project report is accompanied by an information card containing the project's registration index, the name of the project and the name of the report /quite often they do not coincide/ as well as a brief abstract /size: 400 to 1000 bytes/ describing the contents of the report and the results of the work performed. Similar information cards are appended to dissertations. From one to three reports are generally made and sent to VNTIC in the course of fulfillment of a R&D project.

Quite a large proportion of projects are completed without any report being made /e.g. research in the field of "pure" mathematics, research culminating in a published work, collections of normative data, etc./. In such cases, only an information card is sent to VNTIC containing the reason for the absence of a report and a reference to appropriate publications.

The secondary information documents - registration and information cards - are stored in the file, the primary information documents are microfilmed, the original copies of the reports are returned to the respective scientific institutions and the dissertations are sent /for storage/ to public libraries.

All the incoming materials are processed, which includes, among other things, classification using a two-level subject classification scheme; indexing, consisting in the isolation and normalization of the keywords and the establishment of semantic relationships between them; and codification of the formal attributes and characteristics of the project reports and dissertations. Data contained in secondary information documents are, as a rule, used for such processing; the texts of the reports and dissertations are consulted relatively seldom for this purpose.

The subject classification scheme is rather a rough approximation /at two levels of classification, the total number of classess is 33 with about 500 subclasses/; it is used mainly to divide the file of informational documents into subfiles and to systematize materials in publications.Sets of keywords with semantic links between them are used for information retrieval. Codes of characteristics and attributes of the project are used for maintaining statistics and preparing answers to various inquiries.

Notification of potential users of information on new additions to the files is effected by issuing informational periodicals alerting publications which contain information on the projects registered and abstracting publications reflecting the contents of project reports and dissertations. To reduce the labor costs involved in the preparation of these publications, the traditional printing of the texts of the originals is omitted and copies of registration and information cards /after an editor has marked out their texts/ are used as the originals for typesetting. Publications are issued by subject series according to the upper level of the classification scheme; some of these series include two or more classes /the Physical and Mathematical Sciences series, for example, includes materials on mathematics, physics and astronomy/.

Concurrent with topical, "by-the subject" series, issuing of problem-oriented publications has also been started.

Collections of abstracts for each series are provided with cumulative indexes which are issued twice a year.

The publications are distributed among organizations and enterprises of the country.

The file of microcopies of primary documents is used for furnishing microfilmed copies of reports and dissertations to organizations and enterprises of the USSR upon request. At the customer's choice either an enlarged xerox copy on ordinary paper or contact copies of microfilms on diazo film are made. At present, requests for enlarged copies on paper still seem to be prevalent. The flow of requests for copies is growing steadily.

The payment for a copy includes only the cost of copying plus the mailing costs.

VNTIC fulfills a large number of requests from organizations for collections of materials on particular topics, answers various queries about performers, informational publications, etc.

Concurrent with meeting the informational needs of individual organizations and enterprises, VNTIC supplies materials from its files to other institutes and centers servicing branches of industry and regions of the country; these institutes and centers are components of the national system of scientific and technical information. These, in their turn, use the materials supplied by VNTIC to meet the informational needs of the enterprises and organizations of particular branches of industry or regions of the country which these institutes serve. It should be noted that the number of organizations directily served by VNTIC /not counting the users served by branch and regional centers/ is several times as great as the number of organizations supplying R&D information to VNTIC. According to the volumes of information received, the users are distributed in this sequence:

- research institutes and scientific research complexes;
- design and development organisations;
- industrial and agricultural enterprises;
- universities and colleges;
- ministries, agencies and other organisations.

Much attention is being given to the study of the information needs of various categories of research workers and specialists who use the information supplied by VNTIC. The data obtained is used to adjust the system to these information needs. One method for studying user reactions consists in systematic analyses of request statistics and of the contents of formalized "feedback cards" which VNTIC sends to users when fulfilling user requests and which are filled out by the users.

The large quantities of information materials pouring annually into the files of VNTIC, the broad range of fields of R&D covered /all fields of the exact, natural, social and technical sciences/, the great flow of requests for information to be met - all these factors have imposed the necessity for using electronic computers to process, store and disseminate information. An integrated multifuncional automated system /acronym: АСИНИТ, which stands for: Автоматизированная Система Информации по Науке и Технике or Automated System of Scientific and Technical Information/ was developed and has been phased in beginning from 1973 with volumes of information processed gradually increasing.

The system is based on single-time input of varied information taken from each incoming document and multi-functional use of the information files. At the present time, ASINIT is meant to perform the following functions:

- the building up of information files on storage media-magnetic disks and magnetic tapes /files of characteristics and attributes of documents and requests, files of document search patterns in the form of key-words and semantic links between them, files of texts of abstracts, etc./;

- preparation and issue of informational publications;

- processing requests for copies of project reports and dissertations;

- retrospective subject retrieval, on request, and selective dissemination of information /SDI/;

- maintenance of statistics and giving out of various references /information in answer to enquiries/ based on the formal characteristics and attributes of documents.

Besides, ASINIT performs the functions of recording and checking the processing of information at VNTIC.

Each of the functions listed is performed by an appropriate subsystem of the ASINIT system.

In designing the system, the principle of its dynamic expansion has been taken into consideration. This manifested itself with particular prominence when the subsystem of retrospective subject information search was being implemented. As is known, to realize the search, it is necessary to build up an information retrieval language. The choice, for ASINIT, of the language of normalized key-words /single words and set word combinations/ as the information retrieval language with a thesaurus, inevitably poses the problem of creating a thesaurus whose lexical composition should correspond to the features of the information file. In order not to have to wait till sufficient lexical material should be accumulated and the time-consuming multi-subject thesaurus development work should be completed, the principle of dynamic thesaurus construction was proposed and realized. This principle operates in that the thesaurus is built up from key-words picked out of the documents entered into the files, the processes of building up the files of documents and the thesaurus taking place concurrently.As the volume of information materials grows, the thesaurus is built up, to saturation point, this process beginning from the moment the first batches of documents began to come into the files. The methods and procedures developed have also made it possible to automate the main operations of thesaurus construction and to analyse its contents in the process of operating the system.

At present, positive experience has been accumulated on the performance of the major ASINIT subsystems, and prospects for its further development have also taken shape. First of all, a change-over from the batch mode to time-sharing is contemplated, which will allow access to the information files from both local and remote terminals including the conversational mode. This will result in prompter service and a higher precision ratio as well as better and quicker access to the system of collective users /primarily,branch and regional scientific and technical information centers/ and easier exchange of information with them.

As a whole, the currently operating information system on ongoing R&D based on unpublished sources has already taken shape, is developing and contributing to the effectiveness of the activities of scientific institutions of the country and helping to put new developments in science and technology into industrial practice. There can be no doubt that the present forms and methods of work will undergo changes and will be perfected in the future.However, the development of the system will be based on the fundamental principles upon which it was constructed and tested during its first, formative years.

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Session II

Part 1

Paper 6

Summary

INFORMATION EXCHANGE CENTRE FOR FEDERALLY SUPPORTED RESEARCH IN CANADIAN UNIVERSITIES

In accordance with a Cabinet directive to the National Research Council of Canada, an information facility was established in late 1970 to collect data on federally supported research being conducted in Canadian universities. The computer-based information system is an operational unit of the Canada Institute for Scientific and Technical Information, a Division of the National Research Council, which records annually some 10 000 awards of 29 funding agencies to academic investigators.

Following the close of each fiscal year since 1972-73, the annual files have been published in 2-volume directories clustering and displaying the entries by six primary data elements. Present capabilities of the system will be gradually enhanced by further development of the file management routines and also by the extension of data coverage outside the sphere of federal funding.

Résumé

CENTRE D'ECHANGE D'INFORMATIONS SUR LES TRAVAUX DE RECHERCHE DES UNIVERSITES CANADIENNES SUBVENTIONNES PAR LE GOUVERNEMENT FEDERAL

Sur instruction du Cabinet adressée au Conseil national de recherches du Canada, on a créé vers la fin de l'année 1970 un système d'information en vue de recueillir des données sur les travaux de recherches effectués dans les universités canadiennes avec des subventions du gouvernement fédéral. Le système d'information par ordinateur constitue une unité opérationnelle de l'Institut canadien pour l'information scientifique et technique, l'une des divisions du Conseil national de recherches qui enregistre annuellement quelque 10 000 subventions accordées par 29 organismes de financement aux chercheurs des universités.

Depuis 1972-73, au terme de chaque exercice fiscal, les dossiers annuels sont publiés dans des répertoires en 2 volumes où les entrées sont regroupées et présentées en fonction des éléments de données primaires. Les possibilités actuelles du système seront progressivement accrues grâce à l'amélioration des programmes de gestion du fichier et aussi à l'élargissement de la portée du système qui englobera des données autres que les subventions du gouvernement fédéral.

INFORMATION EXCHANGE CENTRE FOR FEDERALLY SUPPORTED RESEARCH IN CANADIAN UNIVERSITIES

J.E. BROWN

During the past five years, Canada has carried out six major studies dealing solely or in part with the establishment of science information policies.

The first of these studies, entitled "Scientific and Technical Information in Canada"/1/, published in 1969, received considerable publicity and is known to many in this audience as the "Tyas Report". The more recent "A Science Policy for Canada"/2/, based on a two-year study by the Senate Special Committee on Science Policy, was published in three volumes between 1970 and 1973.

Out of this welter of studies, recommendation, findings and statistics, it became very evident that essential to the establishment and management of a science policy was a detailed knowledge or national inventory of research and development being carried out in Canada. This inventory was also vital to a national scientific and technical information system,because for such a system to be effective, it must include not only information as published in print and non-print forms, but also information on the availability of human expertise and on the status, progress and results of research and on the applications of such results. Indeed,this all-embracing concept of scientific and technical information /STI/ forms the very basis of Canada's present national network of scientific and technical information services.

In order to achieve this inventory of ongoing research, the National Research Council of Canada /NRC/, in July 1970, was assigned the resposibility for the "establishment of an information exchange centre to cover all federally supported university research in all of the sciences". The emphasis on university research was deliberate for in Canada, unlike the USA for example, the bulk of federally funded research is carried out in the universities and not by industry. The phrasing "all of the sciences" was also deliberate to ensure the Centre covered not only the physical or natural sciences, but also the social sciences.

At the time of this Cabinet resolution, the Canadian government had twenty-eight granting agencies functioning in twenty-two departments, providing roughly ten thousand awards per year to university-based researchers. The multiplicity of sources for subsidies and the overlaps between the activity areas of these funding bodies created a rather hazy field to explore and survey.

This whole matter of federal funding is further complicated by the fact that education, and thus university or academic research, is the responsibility of the provinces, not the federal government. The Information Exchange Centre was seen as a means of supplying three groups with vitally needed information:

1. The Treasury Board and the Cabinet with totals of federal research funding by province to facilitate initial adjustments in fiscal transfer payments for post-secondary education;

2. Science policy planners with various kinds of statistical distributions regarding federal research funding;

3. Researchers, research program managers and operating governmental departments and agencies with detailed information regarding who is doing what research where and how it is supported.

Initial planning of the Information Exchange Centre for Federally Supported Research in Universities /IEC/ was undertaken by a 19-member task force representing the main suppliers of research funding and the users of granting data. This group produced a report identifying the objectives of the project and outlining the methodologies. Implementation of the project was then delegated to the Canada Institute for Scientific and Technical Information /CISTI/, a division of the National Research Council of Canada.

Before proceeding further, and in order to place the following remarks in their proper perspective, I should interpolate a few explanatory words about CISTI.

One of the first results of the various studies which I have just mentioned was the assigning to the National Research Council by the federal government the responsibility for developing a national network of scientific and technical information services. It was further decided that this network should be a decentralized system wherein local and regional information services and expertise would be linked and used for the national benefit.

This assignment was a logical one, for the NRC, during the past 40-50 years, through its National Science Library /NSL/ and its Technical Information Services /TIS/, had already laid the foundation for a national scientific and technical information system. The National Science Library's resources /of some one million volumes/ have been developed over the years in close cooperation with all major libraries in Canada, to the point where they reinforce and complement related resources in other parts of Canada. The National Science Library has also developed a wide variety of services designed to ensure that scientists, engineers, technologists, research workers and managers have ready access to any scientific and technical publication or information required in their day-to-day work.

Concurrently, the Technical Information Service, through the establishment of field offices in each of the provinces and through the operations of an office in Ottawa, was expanding its program to meet the information needs of small and medium-sized industry.

In October 1974, these national information-disseminating services of the NRC were brought together to form the Canada Institute for Scientific and Technical Information. NRC's task is to be innovative. It was felt that through this amalgamation, NRC would be even better equipped to be a leader in developing new methods for the dissemination of information and to fulfil its mission as a planner, promoter and a major participant in the evolving Canadian network of scientific and technical information services.

Happily, as a result of good planning and cooperation on the part of a great many people, the establishment of CISTI coincided with the completion of a magnificent building designed to house the former National Science Library and Technical Information Service. This building, three years in the construction, represents twelve years of planning to design a building which would utilize the latest techniques to facilitate the storage, retrieval and dissemination of information. The next time you are in Ottawa, I hope you will take time to visit what is proving to be a highly functional building and what is also judged by many as one of the federal government's most beautiful and interesting buildings.

To recapitulate, at this stage of development, CISTI

a/ serves as a major node in the evolving Canadian network of scientific and technical information services;

b/ provides national STI services which are operated on a centralized basis because of cost-effectiveness and other considerations;

c/ provides leadership and know-how in developing new STI systems and services;

d/ serves as a link between the Canadian network of STI services and similar foreign and international networks; and

e/ serves as a last port of call and referral centre for STI publications and information not available elsewhere in Canada.

The IEC forms one of the several national STI services which are operated by CISTI on a centralized basis. In early 1971, a small working unit /which formed the nucleus of the IEC/ designed a "data input sheet" containing the minimal number of data elements to be collected and incorporated in the data base. This input questionnaire /see Annex/, which is distributed or completed by the funding agency, requests data on:

1. the name of the chief investigator;
2. the name/s/ of co-investigators;
3. their academic position and educational background;
4. the title of the research project;
5. its estimated length;
6. a maximum 200-word abstract of the research task;
7. the amount awarded, and
8. the name of the granting institution.

Each of the prospective granting agencies were individually approached and asked to cooperate. The response was excellent and the input for the experimental 1971-72 data base was compiled by the active participation of liaison officers in each of the funding bodies. While the data base was being created, two systems-programmers designed and tested a manipulative computer system to store the data in machine-readable form for the production of an annual directory of federal funding for university research.

In May 1972, the first annual data base for IEC was completed containing 10 363 ongoing research projects in the 1971-72 fiscal year. A year later, the first 2-volume IEC Directory was printed in 350 copies and offered for sale with a $ 50,00 price; in less than four months all copies were sold. Since then, this Directory has become a regular publication of CISTI and the three editions published so far are now standard reference tools for Canadian libraries and research institutions.

The latest edition of the Directory covering fiscal year 1974/75 containing 9425 current research projects as reported by 29 federal granting agencies, is organized into five parts. Each of these parts is printed on different coloured paper for easy identification.

Part 1 is a listing of research support by the 29 agencies. Entries include the investigator's name, university and department, title of the project, the amount awarded and an alphanumeric identification code.

Part 2 lists alphabetically the names of investigators appended by the alphanumeric code.

Part 3 is a fiscal breakdown by agency. The funds awarded to each department in each university are individually listed giving the combined totals in a/ departments b/ universities within each c/ province, and d/ the grand total of all funds awarded by each agency.

Part 4 contains a fiscal breakdown by province. The funds awarded to each department in each university are individually listed giving the combined totals for /a/ departments, /b/ universities, and /c/ the grand total of all funds awarded for each province.

It may be of passing interest to note that the grand total for 1974-75 was approximately $ 114 million. In many cases, the projects listed in the Directory represent only a part of the entire funding activity of an agency. Thus, this figure does not represent the total federal funding for research support.

The second volume of the Directory is a computer-generated keyword-out-of-context /KWOC/ subject index comprising all significant terms appearing in project titles. Since Canada is a bilingual country, some of the entries in the Directory appear in English, others in French. The KWOC index displays in one alphabetical order both the English and French terms appearing in the titles. A rather simple technique has been developed for "word equivalencies" in order to cluster adverbial terms /e.g. "chemical"/ under the noun-form /e.g. "chemistry"/. Some 2000 insignificant terms which are not useful in consulting the Directory have been excluded. The two volumes of the third edition contain 1530 pages.

The data compiled by the IEC is proving to be a valuable tool for the government policy maker and the researcher. It also serves as a key to the existence and availability of scientific expertise. Present plans call for extending the coverage to all ongoing research projects funded by the provincial governments, by non-governmental bodies and also research conducted without external funding. With these developments in mind, the original system has been redesigned to accomodate 157 data elements and to make use of an elaborate classification scheme. Through reprogramming of the software, the system, in conformity with our CAN/OLE program, can now operate in an on-line mode and be accessed in both of Canada's official languages.

REFERENCES

1. Science Council of Canada. /ed./ Scientific and Technical Information in Canada. Ottawa, Queen's Printer, 1969. Part I,II. /Special Study No.8./

2. Canada. Senate. A Science Policy for Canada: report of the Special Committee on Science Policy. Ottawa, Information Canada, 1970-1973. vol. 1-3.

National Research Council Canada Conseil national de recherches Canada

ANNEX

INFORMATION EXCHANGE CENTRE FOR FEDERALLY SUPPORTED RESEARCH IN UNIVERSITIES
RESEARCH PROJECT INPUT DATA

To be completed by Project Leader:

Surname:	Given Names:	Position/Rank

Citizenship	Department	University	City & Province

Degrees	College, University, Institution	Year	Specialization
Bachelor's			
Master's			
Doctorate			
Other			

Short title of Research Project:

Abstract:

Key Words /Descriptors:

To be completed by Funding Agency

Dept./Agency/Branch	Grant/Contract Type & No.

Fiscal Year	Amount of Grant/Contract	New/Renewal	I.E.C. No.

Form NRC 560 (Revised 1974)

PERSONAL DATA OF CO-INVESTIGATORS

Project Leader's name:..............................

Short title of Research Project:...

To be completed by co-investigators:

1.

Surname:	Given Names:	Position/Rank

Citizenship	Department	University	City & Province

Degrees	College, University, Institution	Year	Specialization
Bachelor's			
Master's			
Doctorate			
Other			

2.

Surname:	Given Names:	Position/Rank

Citizenship	Department	University	City & Province

Degrees	College, University, Institution	Year	Specialization
Bachelor's			
Master's			
Doctorate			
Other			

3.

Surname:	Given Names:	Position/Rank

Citizenship	Department	University	City & Province

Degrees	College, University, Institution	Year	Specialization
Bachelor's			
Master's			
Doctorate			
Other			

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Session II

Part 1

Paper 7

Summary

SETTING UP THE DEPARTMENT OF THE ENVIRONMENT REGISTER OF RESEARCH

The paper describes the annual collection, organisation, use, and publication, by the Department of the Environment of United Kingdom, research project details in the subject areas of Environmental Pollution, Planning, Building, Construction and Transport. The paper examines briefly the range and types of research and source, the methods of collection, questionnaire design, definition of research, handling and organistaion, publication, indexing and retrieval. An example of the questionnaires, explanation sheets, and covering letter used is contained in the annex. Finally, the authors look at the costs and manpower involved and assess the value to the Department and others as indicated by demand, comments and quotes from users and contributors.

Résumé

LE REGISTRE DE LA RECHERCHE DU DEPARTEMENT DE L'ENVIRONNEMENT

L'auteur de l'exposé montre comment, chaque année, le Département de l'environnement du Royaume-Uni rassemble, organise, utilise et publie des renseignements détaillés sur les projets de recherche concernant la pollution de l'environnement, la planification, la construction et les transports. Il examine ensuite rapidement la gamme et les types de sources d'information, les méthodes de rassemblement des données, la conception des questionnaires, la définition des travaux de recherche, les problèmes de maniement et d'organisation, la publication d'informations, l'indexation et la recherche documentaire. L'annexe contient des exemples de questionnaires, des notices explicatives et des lettres de couverture utilisés.

L'auteur examine enfin les problèmes de coût et de main-d'oeuvre et il évalue l'intérêt que présente le système, pour le Département notamment, en se fondant sur les demandes, les commentaires et les citations des utilisateurs de l'information et de ceux qui la fournissent.

SETTING UP THE DEPARTMENT OF THE ENVIRONMENT REGISTER OF RESEARCH

J.C. CREASEY

1. Background

With the formation of the Department of the Environment in 1970, an increasing need was felt for the regular central collection of records of UK research in the subject areas for which the Department had a responsibility. This need arose because the Department was required to submit details of research to a number of national and international bodies as well as giving support to its own committees and research programme.

The constituent parts of the Department of the Environment, ie. the Ministry of Housing and Local Government, the Ministry of Transport and the Ministry of Public Building and Works, had each been involved in varying degrees with published and unpublished records or registers of research, and the relevance of these to the work of the new Department was, therefore, examined. The Government's responsibilities for aspects of pollution and the protection of the environment led to the production of a short title register of pollution research by the newly formed Central Unit for Environmental Pollution. The former Ministry of Housing and Local Government Library had been closely involved with the production of "Planning Research", the register of the Royal Town Planning Institute, as well as with the collection of research work connected with its own Ministry. When the Royal Town Planning Institute could no longer continue their register the Headquarters Library of the Department of the Environment was asked to collect the research and publish the next edition. /The research was collected in 1973 and published in 1974 as Environmental Planning Research./ At the same time it was felt to be more appropriate for the Library to produce the next edition of the pollution register. /The research was collected in 1973/74 and published in 1974 as Index of Government and Government Supported Research in Environmental Pollution in Great Britain./ As a result of this gradual centralisation of record responsibilities in the Headquarters Library it soon became obvious that standardisation was needed in order to handle the research records with the greatest economy and efficiency. A committee /the Information Liaison Committee/ was therefore formed to discuss the arrangements and link the work of the Library with the Directorate of Research Requirements and with the Research Establishments concerned with building and transport.

2. Preparation

During the preparation of the DOE Register of Research 1974 the Information Liaison Committee discussed and examined a number of key points of which the following are the most important:

/a/ Method of collection

Alternative methods of collection comprise visit and interview, direct collection by questionnaire, arranged input from funding bodies, from spe-

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cial collection points and by the use of secondary sources or a combination of these methods.

Visit and interview was considered an expensive system which would only be justified as an emergency support where an organisation with a large amount of research could not otherwise provide a reply. A series of meetings was held with Government Departments and Research Councils who were actively concerned with funding large amounts of research, with the idea of combining the records that they maintained to form the major input to the Register. Although all the funding bodies were in favour of co-operation the records were in such widely different forms, from magnetic tape to manuscript cards, and with information varying from short title entry to full descriptive details that a great deal of staff effort would have been required to get the records into a standard form. Another method briefly considered was the wide establishment of special collection points arranged by administrative and subject areas but this depends for success upon gradual development over a number of years and for that reason it was not adopted at such an early stage. It is also very useful to collect research information from secondary sources such as published and unpublished listings, records and registers as well as by careful scrutiny of a wide range of relevant periodicals. This method has on the one hand the unreliability of secondary sources but provides on the other a continuous and current alerting service to new and recent research work. It is an excellent backup to widely spaced surveys conducted by direct questionnaire.

The reliability of the direct questionnaire method was already part of the experience of the Department and it was therefore decided to send forms to all potential contributing organisations and to use other methods as a support where appropriate.

/b/ Frequency

Most major organisations in the UK who are concerned with research are asked to complete a number of returns and questionnaires for a range of surveys and registers. It is therefore unreasonable to expect a full reliable return more frequently than annually. Reliance on a direct questionnaire survey every three years allows the information to become very out of date. However a compromise is for new projects to be collected every three years and for existing project descriptions to be brought up to date in the intervening years by sending out the old entries for amendment.

Since the DOE is required to make annual returns of research to various national and international bodies it was decided to collect new material and bring up to date existing material each year.

/c/ Design of questionnaire form

It was recognised that there was a need for a simple, clear and attractive form which would encourage those receiving it to complete all the questions with a minimum of trouble. Since standardisation and compatibility were important the Committee were to some extent controlled by the existing International Road Research Documentation form which would carry some of the transport research, as well as by the planning for the International Referral Service form. Apart from the basic information about any research project, ie. contributing organisation, title, research workers, duration, sponsoring body, finance and publications, it was felt important to allow a larger area on the form for the project description and statement of method. Manpower and cost figures were carefully discussed because of their possible importance in the assessment of research effort in subject areas. Provision for the return of restricted or confidential material was also noted.

Largely because of the importance of compatibility, a single sheet questionnaire based on the IRRD form and designed for computer processing where desirable was finally adopted. /See annex C-E./

/d/ Definition of research

It was decided that any register of research produced by DOE should be confined to work that was generally regarded as research. The British Treasury had adopted for Government use a definition of research conceived by a group of OECD experts who met near Rome at Frascati. They had produced some related definitions for scientific and technological research. This was followed by a separate group of OECD experts meeting a little later in Paris who produced another definition for social science research. The Committe therefore produced a careful summary of the definitions for the two areas, as follows, taken from the lengthy conclusions at the OECD Frascati and Paris meetings. "Research and experimental development may be defined as creative work undertaken on a systematic basis to increase the stock of scientific and technical knowledge, including the knowledge of man, culture and society and the use of this stock of knowledge to devise new applications".

/e/ Research sources

The selection of sources was based on the lists of organisations which had contributed to previous registers. These fell into a number of groups, ie. university and polytechnic, government and government research establishments, national industry, private industry, consultants, research institutes, local authorities and associations and councils. It was decided that the current names and addresses of those already known about would be checked and used. Further relevant organisations could be added from current reference sources and from contacts and requests as the register developed. This gradual development of a source list was seen to be most important for the newer area of environmental pollution because, for example, a whole range of chemistry and biology projects were potential contributors to some eventual aspect of pollution control, and yet the organisations involved could not easily be identified as sources for the subject of pollution.

The survey was to be conducted from three parts of the Department which deal respectively with planning, transport and building, and therefore a masterlist of the organisations for which each part was responsible was compiled to avoid duplication in those cases where a source was providing information in two or more subject areas.

/f/ Subject scope

The subject scope of the Register was defined by those areas and those aspects for which the Department of the Environment has a responsibility, and this is basically aspects of planning, pollution, transport and building. Lists of the main sub-sections were compiled as a means of reminding recipients of the forms of the relevance of their work, and as a help with decisions about the scope and overlap of each subject volume. /See annex B./

/g/ Need for publication

A full return was thought more likely if the contributors knew that the entries were to be published. Free volumes were considered something of an advertisement as well as a means of aiding growth through the knowledge of further sources. With the right publicity, a free published register could be brought to the attention of a wide range of both administrators and research workers and allow them to examine and assess the material for themselves, as well as enable them to contact the research worker or an administrative point in the organization concerned. Personal examination of the Register was also considered valuable in alerting members of multi-disciplinary teams to relevant research that they might not have been aware of otherwise. It is also easier for an enquirer with a fully indexed published work to search effectively for research relating to changing concepts such as the quality of life, the deprivation cycle, environmental protection, or conservation.

/h/ Form of published entry

The full descriptive entry which had been used so successfully for several editions of the Royal Town Planning Institute's "Planning Register" was largely adopted for style of entry in the proposed publication. This was also because collection of full detail was needed to meet the requirements of the Department, and it seemed sensible to publish as much as possible so that users could make a reasonable assessment of the project and then make direct contact with the research worker for further information. The entries were designed to be arranged in alphabetical order by organisation within subject group, and with the support of full indexes.

/j/ Enquiry service

It was recognised that any enquiry service based on research records would be controlled by the manual, computer or other system already in use at the point providing that service. Searching in the social science fields often requires a serendipity or browsing facility which is more easily and cheaply provided by register production and card records. Computer retrieval is likely to be more effective in specific scientific and technical fields.

3. Operation

Building on the experience of the 1974 DOE Register of Research, it was decided at the beginning of this year to survey a very much larger range of organisations and to publish four fully indexed volumes of research covering building and construction, environmental planning, roads and transport, and environmental pollution. Production of this DOE Register of Research 1975 has been based on the following sequence.

/a/ The package

The basic package sent to each organisation consisted of an appropriate number of white and green questionnaire forms for research and survey work respectively, a sheet explaining how to fill in the forms, a subject listing to indicate the fields of interest and a covering letter to explain the general needs and aims of the activity.

The package, which was completed by an order sheet for DOE research registers, was designed to be sent out with copies of previous returns, for correction and amendment by the contributing body.

/b/ Distribution

The packages were sent out at the beginning of February to about 2250 organisations and were addressed in the case of the local authorities to the chief executives, to the heads of departments in the universities and to a personal contact or office in the case of the others.

/c/ Reminders

By mid-March about 1000 organisations had made a positive return /which had been acknowledged/ or had promised a return. The remaining 1250 organisations were sent reminder cards and by the beginning of April 500 further replies had been received. The 750 outstanding organisations were now telephoned to see if they could be helped with a reply. These telephone calls resulted in three types of reply in the form of promised action, nil return or a request for more forms.

/d/ Selection for publication

Material for publication was selected from the completed returns first by excluding the green forms bearing the survey-type work which although a valuabla contribution to the data base was to be used for other publications and services. Secondly the white forms were scrutinised for subject relevance and for a sufficient amount of information. Thirdly the lists and reports submitted as substitutes were similarly vetted for research, for subject relevance and level of entry.

/e/ Receipt for publication

April 15th was decided as the date beyond which any returns,however relevant, could not be considered for inclusion in the published volumes. It is necessary to try to resist the temptation to slip in important returns which arrive late. The publication cut-off date is a critical one because it must allow the receipt of a sufficient number of useful returns and yet allow time to process all the entries.

/f/ Classification

Classification can result from a pre-conceived scheme of divisions into which all the returns are placed, or the practical sorting of the material returned into the most suitable categories. A combination of these methods is often the best. However it must be borne in mind that standardisation of the classification may be essential to the proper cumulation and use of material from year to year.

/g/ Editing

Editing requires guidance and rules for a whole range of things from the treatment of personal and corporate names to the eventual type style of entries. Much that should be incorporated into editing rules only becomes evident with progressive experience, and therefore the sensible initiative of a good editing staff is extremely important. Standardisation and better presentation of any part of the text is a natural part of the editing function. Clear marking is required so that typing onto cards or directly as the final version may be undertaken easily. Legibility is extremely important and poor writing or poor photocopies can considerably lengthen the job and cause errors.

/h/ Production methods

Three basic production methods were used as foolows. First the typing of information from the edited forms onto cards for sorting and final typing. Second, direct final typing from edited forms as received and prior to arrangement in classified sequence. The entries are then cut and stuck in order at a later date. Third, the typing of the final version direct from the edited forms when classified and in sequence. These combined methods give production flexibility and should be related to manpower and resources available.

/j/ Duplicate entries

The aim was to place in each of the volumes material that most people would expect to find there according to the subject name, Building and construction, Environmental planning, Roads and transport, or Environmental pollution. It was therefore necessary to place some items in more than one volume,e.g. projects on aspects of concrete concerning both transport and building. This can require a considerable amount of photocopying of the original returns or of the cards. Copies of most of the text are required anyway for indexers and for other work which cannot be carried out centrally.

/k/ Indexes

Indexes of research workers, contributing bodies, sponsoring organisations and subjects were prepared to support each volume with the addition of an address list. The four important subject indexes were compiled in each case by a person with experience of the relevant subject field. Two traditional manual indexes and two computer KWIC indexes were used to give flexibility and means of comparison. Index production cannot be started until classification and consecutive numbering of the relevant edited entries has been completed.The earliest at which this can be completed is the publication cut off date.

/l/ Publication

Her Majesty's Stationery Office advised about the weight and type of paper as well as the exact text area for the camera-ready version of the full text. The material was prepared on A3 size sheets for photo-reduction,rolling and binding by HMSO. The matt coloured cover papers were adopted because they were easier to work with, did not take finger marks like glossy papers and were much cheaper. The text had been prepared on IBM "golfball"equipment.

4. Problems and lessons

/a/ General administration

It is extremely difficult to find any organisation which can centralise satisfactorily the range of expertise and resources to prepare, collect, process and publish within a tight time schedule. It is a seasonal occupation and requires engagement of special staff. It should be stressed that support staff will be needed to maintain production and efficiency on some of the repetitive jobs.

On the other hand it is possible to administer centrally and to contract and sub-contract out to other people. This method has the disadvantage that so many people are involved in closely linked operations that there is a real danger of errors and partial understanding because of poor communication. A compromise is probably the most efficient method.

In our own case the collection of the material and the production of the Register of Research volumes up to camera-ready stage just prior to publication was placed with a contractor, the Science Policy Foundation.

/b/ Overlap

Many organisations are developing collections of the descriptions of research projects in their subject areas.This is a function which is natural to libraries who have the important practical experience of information collection and use. The Department is making every effort to standardise research information gathering in the UK by co-operating with other organisations in order to avoid duplication.

/c/ Surveys

The real need for and value of the survey-type material has now been established so that it is collected as a normal part of the Register.

/d/ Frascati

The definition of research arrived at by the OECD group of experts provided great difficulty for many people when considering the relevance of their own work. Some of the less sophisticated local authority work may possess unique creative points which in academic terms qualify it as research although most research workers would regard it as ordinary survey work. On the other hand some university work quite easily accepted by many as research is, on closer inspection, large scale survey work.

/e/ Collection points

The gradual development through experience of the right addresses and contact points is extremely important. As card and telephone reminders went out it soon became obvious that many bundles of questionnaires had been lost in large organisations. It is very important to foster named collection points in large administrations.

/f/ Pre-publication use

One reason for using cards in the production system is to allow easier exploitation of the information at an early stage. There is however a very real danger of disruption and muddle arising in the production and processing systems if people are permitted to sort and copy parts of the information for other purposes.

/g/ Production

The use of cards as part of the production method requires two lots of typing and checking of the text. If the card stage is to be dispensed with it is necessary to find typing staff of sufficient calibre to type the material direct from the questionnaire forms. Alternatively one can develop the typing, checking and storage of the entries on paper tape for automatic reproduction later or feed the information into a computer for eventual computer typesetting; but the smooth running of machine bound methods requires several trial developments and the insurance of manual methods in the early stages. Whether manual or machine methods are used it is important to allow sufficient resources to select, classify and store the entries as soon after receipt as possible so that they may be used with confidence for enquiry and other purposes and yet avoid error and confusion later.

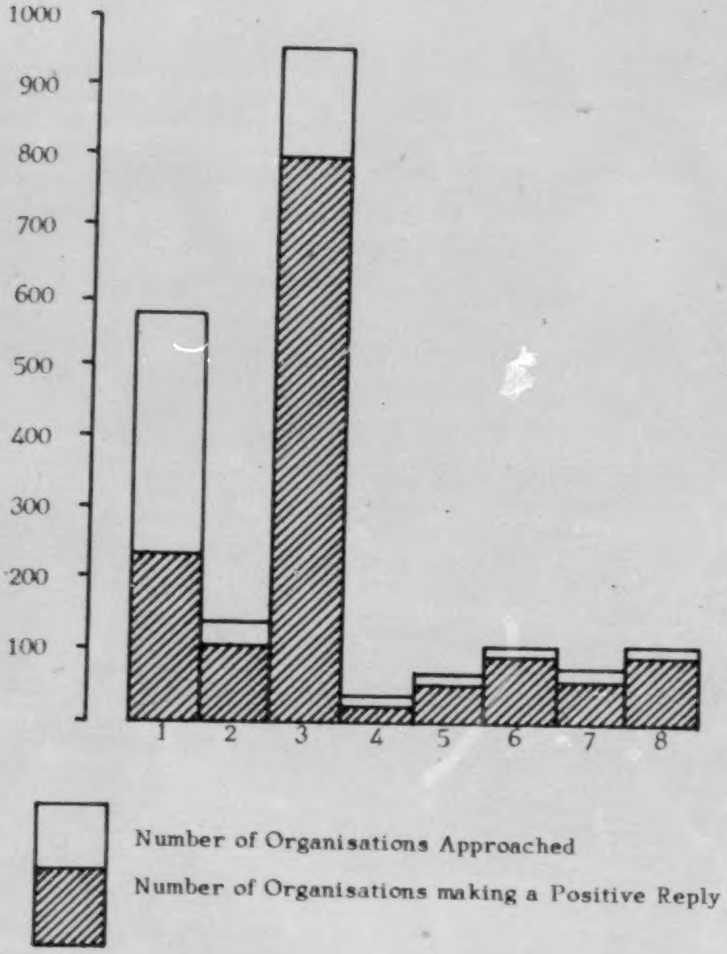
/h/ Users and use

The 1974 Register was the start of greater centralised collection of research records to give more support to the increasing needs of research workers, administrators, working groups and committees in the Department of the Environment, who are concerned with reviews, assessment and formulation of research for departmental, government, national and international needs. Publication of the Register and the support of an enquiry service was also to give help to research institutions, organisations commissioning and planning research, individual researchers and users of research results. About 500 requests a month were received by telephone, letter and visit after publication and analysis of the records reveals the much greater use by government and local government organisations, although the real use and the real needs may be hidden. Research workers at the bench may not be aware of a volume gathering dust in the Library of their own organisation. The value of the right information at the right time is difficult to find out about and impossible to cost.

5. Outcome

The two published volumes of the 1974 Register have this year been replaced by four larger volumes dealing with building and construction, environmental planning, roads and transport, and environmental pollution, and

ANALYSIS OF RETURNS FROM ORGANISATIONS



1 Local Authorities
2 Government Excluding DOE
3 Universities
4 National Industries

5 Research Institutes
6 Private Industry
7 Consultants
8 Associations and Councils

containing between them some 5000 entries selected from a return of about 6000 research projects. A 70% return from organisations was received in spite of the immense difficulties for local authorities during the reorganisation of local government. Two thousand copies of DOE Register of Research 1975 are to be published and the remaining material which did not meet the publication date or was excluded by research definition will be part of the data base for answers to enquiries and requests, and for use in other publications. The cost of the collection and production up to camera-ready copy was about £ 10 000 /See Diagram/.

6. The Future

The Department of the Environment has a steady volume of departmental, national and international needs and commitments, many of them annual. For this reason alone it is likely that annual collection will continue, although this must depend on regular reviews and assessments of the situation. With growing experience of the sources, the handling techniques and the other current research collecting ventures, the DOE Register may go further than the confirmation of its position as the most important full entry register of research published in the United Kingdom, and become the nucleus for a sensible cost-effective centralised store and service not only in the DOE areas of responsibility but also in a wide range of associated environmental fields.

Annex A

LIST OF RESEARCH REGISTERS ASSOCIATED WITH THE DEVELOPMENT OF THE DOE REGISTER OF RESEARCH

A. Building

1. Department of the Environment. Fourth survey of research and development for the construction industry 1970. HMSO 1972. £ 5. IV, 220 p. /Includes indexes by subject and institution; and manpower and expenditure tables by contributing group and subject./

2. Department of the Environment. Register of Research 1974. Part I. Construction. /Indexes by contributor, investigator and subject./

B. Planning

3. Town Planning Institute. Planning research. 3rd edition. 1968.. £ 3.10. XXVII, 236 p. /Contains 1511 projects, indexes by contributing body, research worker, and subject; a list of planning officers as well as a directory of research institutions. Notable for its twenty trend reports consisting of specialist reviews of the work over the previous three years./

4. Royal Town Planning Institute. Planning research. Supplement 1971. /Classified title listing of 1444 projects covering 1968-1970. Index of contributing bodies./

5. Royal Town Planning Institute. Planning research. Second supplement 1972. /Classified title listing of 955 projects. Index of contributing bodies./

6. Department of the Environment. Environmental planning research. 1974. £ 5. No. 15 in the Library Information Series. X, 278 p. /Contains 1261 projects with indexes for research worker, organisation and subject. Also full cross references./

7. Department of the Environment. Register of Research 1974. Part II. Environmental planning with an appendix on certain projects in pollution. VI, 214 p. /669 projects with supporting indexes by research sponsor, research worker, contributing bodies and subject. List of addresses./

C. Pollution

8. Department of the Environment. Index of government and government supported research in environmental pollution in Great Britain 1971. 104 p. /Contains 547 projects described by short title with support of institution and subject indexes and addresses, including director's name and Department responsible./

9. Department of the Environment. Index of government and government supported research in environmental pollution in Great Britain 1972. 146 p. /Contains 616 projects with supporting indexes etc. similar to 8 above./

10. Department of the Environment. Index of government and government supported research in environmental pollution in Great Britain 1973. 206 p. /Contains 819 projects described by short title entry with support of indexes by institution and subject. Address List./

MAIN SUBJECT AREAS FOR THE DOE REGISTER OF RESEARCH 1975

ENVIRONMENTAL PLANNING

Land and land use includes erosion, reclamation and estate management.

Physical and economic planning and development includes regional, urban, rural and coastal planning, planning finance, administration and training, development and economics of development.

Demography includes structure, development and migration.

Sociology includes urban, rural and community structure as well as the needs of special social groups.

Housing and residential areas including administrative, social, legislative and economic aspects.

New towns and expanded towns.

Central government administration includes organisation, tribunals, public enquiries and decentralisation.

Local government includes administration, organisation, finance and public participation.

Public services and needs includes offices; recreational, religious, health, educational and commercial services.

Water and water supply includes resources, distribution, purification and demand.

Industry and labour includes national, regional, urban and rural aspects, labour mobility, location of industry and public utilities.

Conservation and historic towns and buildings, and ancient monuments.

Townscape and landscape the built environment including visual aspects of architecture and landscape, housing, industry and countryside. Derelict land.

Sport recreation and countryside includes national parks, tourism, conservation and water recreations.

Natural resources includes minerals.

Public health includes sewerage and sewage disposal.

POLLUTION AND POLLUTION CONTROL

Air pollution.

Freshwater pollution.

Marine pollution includes main estuary and coastal pollution.

Land pollution includes pesticides, herbicides and farm wastes.

Solid wastes includes domestic refuse and industrial wastes.

Noise.

Radioactivity.

Toxic metals, particularly lead, mercury and cadmium.

Recycling and reclamation of materials.

TRANSPORT

Design, construction and maintenance of roads, tracks, inland waterway courses, bridges, tunnels and installations.

Transport, planning, operation and control.

Transport systems including rapid transit and containerisation.

Vehicles, excluding aircraft and ships.

Safety, road and vehicle, road user.

Environmental effects of transport.

Multimodal studies includes air/sea, air/rail studies.

Transport economics and administration.

NOTE: Transport is taken to mean inland transport, including air transport up to the end of take-off procedures.

BUILDING AND CONSTRUCTION

Construction materials includes metals, inorganic and organic materials.

Geology includes geotechnics.

Hydraulics and hydrology.

Structures other than transport structures, including structural theory, concrete, civil engineering structures.

Construction industry, structure of the industry, economics, efficiency, management, construction processes, maintenance manufacture of components.

Design process architectural design, function and performance of buildings, components and elements including effects of macro and micro-climate, fire resistance and prevention.

Spatial studies layout of internal spaces, estate layout, dimensional studies.

Environmental studies in interior design including thermal factors, the aural and visual environment of the built form.

Services design, installation and operation of construction services.

DEPARTMENT OF THE ENVIRONMENT REGISTER OF RESEARCH

Research definition for entries on white form

Research and experimental development may be defined as creative work undertaken on a systematic basis to increase the stock of scientific and technical knowledge, including the knowledge of man, culture and society and the use of this stock of knowledge to devise new applications.

Please report on the green form all other work which is excluded by definition from entry on the white form. This will include surveys, plans, studies, operations, practice, development and collation and interpretation of data and statistics.

GUIDANCE NOTES FOR COMPLETING RESEARCH PROJECT FORMS

1. Name of person completing form
   Please insert your own name here and your organistaion if it differs from 311 or 321 below. If not, indicate "as 311" or "as 321" as appropriate.

2. Title /211/
   All research is "A study of .." or "An investigation of ...." some problem, so these introductory words should be omitted. The title hould describe the problem specifically but as briefly as possible, indicating its general rather than its local interest.

3. Research team /221/
   The immediate leader of the team and his senior assistant or assistants should be named in capitals or typed. The name of the Director of Research should not be given unless he is himself personally involved in the project. The affiliation of the investigator should also be given, or simply "as 311A".

4. Research organisation carrying out project /311/
   Leave first box on line 311C clear.

   Give here in appropriate space the full name and address of the organisation /eg. including University Department/ where the work is being conducted, and the title of the parent body unless this is obviously the same as that given under Sponsor. Names should be given in capitals and abbreviations for organisations, if used, should be accompanied in the first instance by the full title. The box headed "research organisation project code" is provided for your own internal project reference No. This may be of use to you in identifying the project when updating information is requested.

   The name and address of the "2nd Research Organisation" should only be completed where the project is being carried out jointly by two organisations.

5. Sponsor /321/
   Enter the name of the main body providing the whole or the major part of

the funds from which the cost of the project is to be met. Where the project is being sponsored jointly by two sponsors, the name, address etc. of the second sponsor should be supplied in the boxes provided.

6. Project data /331/
/a/ Costs /331/

Please enter the total budget provision.

If you are unable to give the exact figure please indicate within bands by the use of stars as follows:

*	under £ 5000
**	£ 5000 - £ 10 000
***	£ 10 001 - £ 25 000
****	£ 25 001 - £ 50 000
*****	over £ 50 000

/b/ Staff /331/

Please enter total number of professional and technical staff.

/c/ Starting and completion dates /331/

Give dates in months and years. The starting date is that month and year in which the research actually began.

/d/ Present Position /331/

Select the appropriate category from the following list:

Active, ie being actively pursued and is in progress.

Future, ie funded but research not yet started.

Research completed, ie report is still being prepared. The space for actual completion date should then be left blank.

Completed, ie research completed and reports, if any, issued. The space for actual completion date should then be completed.

Abandoned, ie research has been stopped and is unlikely to be resumed in the foreseeable future.

In abeyance, ie research has only been temporarily stopped.

Superseded by, ie superseded by another project /if possible cross-reference should be given to the project which supersedes it/.

7. Summary /511/

The summary should indicate the aims of the research, state the methods and techniques to be employed and mention any equipment specially devised for it as well as any field or experimental work that many be involved. If the work is completed, a brief statement of the results should be added; any report published or to be published should be mentioned in section 711 of the survey form.

8. Reports issued /711/

A bibliographic reference for published reports is appropriate here: for unpublished reports the entry should include the source of whom application for copies may be addressed.

9. Restrictions on access

If there is any data which you do not wish to be made available outside the DOE please place a diagonal line across the box in which the data is written.

DEPARTMENT OF THE ENVIRONMENT
REGISTER OF RESEARCH

Annex D

1 2 3	4	5	21	31	41	51	61	71 80
211 TITLE	A		TITLE					
221 RESEARCH TEAM	A		1ST INVESTIGATOR			AFFILIATION		
	B		2ND INVESTIGATOR			AFFILIATION		
	C		3RD INVESTIGATOR			AFFILIATION		
311 RESEARCH ORGANISATION WHERE PROJECT IS CARRIED OUT	A		NAME OF 1ST RESEARCH ORGANISATION					
	B		ADDRESS					
	C				COUNTRY		RESEARCH ORG. PROJECT CODE	
	D		TELEPHONE		TELEX/CABLE			
	E		NAME OF 2ND RESEARCH ORGANISATION					
	F		ADDRESS					
	G				COUNTRY		RESEARCH ORG. PROJECT CODE	
	H		TELEPHONE		TELEX/CABLE			
321 SPONSOR(S)	A		1ST SPONSOR					
	B		ADDRESS					
	C				COUNTRY		RESEARCH ORG. PROJECT CODE	
	D		TELEPHONE		TELEX/CABLE			
	E		2ND SPONSOR					
	F		ADDRESS					
	G				COUNTRY		RESEARCH ORG. PROJECT CODE	
	H		TELEPHONE		TELEX/CABLE			
331 PROJECT DATA	A		TOTAL BUDGET			STARTING DATE	ESTIMATED COMPLETION DATE	ACTUAL COMPLETION DATE
	B		ANNUAL BUDGET		PRESENT POSITION			DATE OF COMPLETION OF THIS FORM
	C		NO. OF STAFF (CURRENT YEAR)					

1 2 3	4	5	21 31 41	51 61	71 80
511 SUMMARY DESCRIPTION OF PROJECTS AIMS, METHODS, PROGRESS TO DATE AND RESULTS	A				
711 REPORTS PUBLISHED OR PENDING PUBLICATION	A		TITLE (1)		
	B		AUTHOR	DOCUMENT DATA *	DATE OF PUBLICATION
	C		BIBLIOGRAPHIC DETAILS (JOURNAL OR PUBLISHER OR SOURCE IF UNPUBLISHED)		
	D		TITLE (2)		
	E		AUTHOR	DOCUMENT DATA *	DATE OF PUBLICATION
	F		BIBLIOGRAPHIC DETAILS (JOURNAL OR PUBLISHER OR SOURCE IF UNPUBLISHED)		
	G		TITLE (3)		
	H		AUTHOR	DOCUMENT DATA *	DATE OF PUBLICATION
	I		BIBLIOGRAPHIC DETAILS (JOURNAL OR PUBLISHER OR SOURCE IF UNPUBLISHED)		

UPDATING DATA	DATE	PRESENT POSITION	DATE	PRESENT POSITION

* IF JOURNAL ARTICLE ENTER HERE VOLUME, ISSUE NUMBER, FIRST AND LAST PAGE NUMBERS.
IF A REPORT ENTER TYPE OF REPORT (e.g. THESIS, INTERIM REPORT) AND NUMBER OF PAGES.

DEPARTMENT OF THE ENVIRONMENT

REGISTER OF RESEARCH

Annex E

PLEASE USE THIS FORM FOR SURVEYS PLANS STUDIES OPERATIONS PRACTICE DEVELOPMENT AND COLLATION AND INTERPRETATION OF DATA AND STATISTICS EXCLUDED BY DEFINITION FROM THE WHITE FORM

1 2 3	4	5	21	31	41	51	61	71 80
211 TITLE	A		TITLE					
221 RESEARCH TEAM	A		1ST INVESTIGATOR			AFFILIATION		
	B		2ND INVESTIGATOR			AFFILIATION		
	C		3RD INVESTIGATOR			AFFILIATION		
311 RESEARCH ORGANISATION WHERE PROJECT IS CARRIED OUT	A		NAME OF 1ST RESEARCH ORGANISATION					
	B		ADDRESS					
	C				COUNTRY		RESEARCH ORG. PROJECT CODE	
	D		TELEPHONE		TELEX/CABLE			
	E		NAME OF 2ND RESEARCH ORGANISATION					
	F		ADDRESS					
	G				COUNTRY		RESEARCH ORG. PROJECT CODE	
	H		TELEPHONE		TELEX/CABLE			
321 SPONSOR(S)	A		1ST SPONSOR					
	B		ADDRESS					
	C				COUNTRY		RESEARCH ORG. PROJECT CODE	
	D		TELEPHONE		TELEX/CABLE			
	E		2ND SPONSOR					
	F		ADDRESS					
	G				COUNTRY		RESEARCH ORG. PROJECT CODE	
	H		TELEPHONE		TELEX/CABLE			
331 PROJECT DATA	A		TOTAL BUDGET			STARTING DATE	ESTIMATED COMPLETION DATE	ACTUAL COMPLETION DATE
	B		ANNUAL BUDGET		PRESENT POSITION			DATE OF COMPLETION OF THIS FORM
	C		NO. OF STAFF (CURRENT YEAR)					

1 2 3	4	5	21	31	41	51	61	71 80
511 SUMMARY DESCRIPTION OF PROJECTS AIMS, METHODS, PROGRESS TO DATE AND RESULTS	A							

711 REPORTS PUBLISHED OR PENDING PUBLICATION	A		TITLE (1)		
	B		AUTHOR	DOCUMENT DATA *	DATE OF PUBLICATION
	C		BIBLIOGRAPHIC DETAILS (JOURNAL OR PUBLISHER OR SOURCE IF UNPUBLISHED)		
	D		TITLE (2)		
	E		AUTHOR	DOCUMENT DATA *	DATE OF PUBLICATION
	F		BIBLIOGRAPHIC DETAILS (JOURNAL OR PUBLISHER OR SOURCE IF UNPUBLISHED)		
	G		TITLE (3)		
	H		AUTHOR	DOCUMENT DATA *	DATE OF PUBLICATION
	I		BIBLIOGRAPHIC DETAILS (JOURNAL OR PUBLISHER OR SOURCE IF UNPUBLISHED)		

UPDATING DATA	DATE	PRESENT POSITION	DATE	PRESENT POSITION

* IF JOURNAL ARTICLE ENTER HERE VOLUME, ISSUE NUMBER, FIRST AND LAST PAGE NUMBERS.
IF A REPORT ENTER TYPE OF REPORT (e.g. THESIS, INTERIM REPORT) AND NUMBER OF PAGES.

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India

Session II

Part 1

Paper 8

Summary

DATA ELEMENTS IN A RECORD OF AN ONGOING RESEARCH PROJECT

The paper presents a study of data elements in a record of ongoing research suggested in the UNISIST guidelines on the conduct of national inventory of current research and development projects as compared with other proforma used for a similar purpose. The data elements are categorized in relation to the use of a registry of ongoing research for different information purposes at the local, national, and international levels. The elements are given different weighings in relation to these uses and levels of information exchange. The desirability of guidelines pertaining to the differentiation of items of information to be given in registers and data bases on ongoing research used for different purposes is discussed.

Résumé

ELEMENTS DE DONNEES POUR L'ENREGISTREMENT D'UN PROJET DE RECHERCHE EN COURS

L'auteur de l'exposé étudie les éléments de données à prendre en considération pour enregistrer un projet de recherche en cours d'exécution qui sont suggérés dans les Principes directeurs de l'UNISIST pour l'établissement d'un inventaire national des projets de recherche et de développement en cours, et il les compare à d'autres modèles utilisés dans un but analogue. Les éléments de données sont classés pour pouvoir être utilisés dans un registre des recherches en cours, à différentes fins d'information aux niveaux local, national et international. Les éléments sont affectés d'indices de pondérations différents selon leur utilisation et le niveau auquel se produit l'échange d'information. L'auteur de l'exposé examine également l'opportunité d'établir des principes directeurs permettant de différencier les éléments d'information à insérer dans les registres et les bases de données sur les travaux de recherche en cours utilisés à diverses fins.

DATA ELEMENTS IN A RECORD OF AN ONGOING RESEARCH PROJECT

A. NEELAMEGHAN

1. DATA ELEMENTS IN RELATION TO THE USES OF A REGISTRY OF ONGOING RESEARCH

The UNISIST Guidelines on the Conduct of a National Inventory of Current Research and Development Projects /SC/75/WS/13, March 1975/ enumerates various uses of a national registry of ongoing research /ROR/. Each data element in an entry for an ongoing research project in a ROR can be related to some particular informational use of the data elements. Usually two main categories of use of the ROR information are recognized. These are:

a/ Use by researchers /that is, research communication use/; and

b/ Use in planning and management of research and development /that is, management use/.

These categories of use are not mutually exclusive for all the data elements. For some of the elements both the uses can be found. Consider for instance some of the uses mentioned in the UNISIST Guidelines /page 3/:

"To enable user to stay abreast of new R & D projects" - this is mainly a concern of the researcher.

"To provide a current profile of national R & D as a tool for the administration of international scientific relations" - this is mainly related to R & D planning and management.

"To trace projects of individual scientists, departments and research centres" or "To locate specialists in a specific subject" - these could be the concern of researchers as well as of R & D planners and managers.

To these two categories of use we can add a third one, namely, use in information service, such as in referral and information systems interconnection and networking. In fact, some of the management uses enumerated in the UNISIST Guidelines could be conveniently categorized as use in information service - for example, "To trace projects of individual scientists, etc." and "To locate specialists in a specific subject". Information of this type, once obtained, can be used for various management purposes. As we progress towards national and global information networks and train our minds to think increasingly in terms of systems interconnection, the data elements in a record in a ROR useful for such purposes would also assume correspondingly increasing importance.

2. DATA ELEMENTS IN RELATION TO THE LEVELS OF USE OF ROR

Levels of Use

The data elements in an entry in an ROR can also be considered from the angle of use of the register at different levels - local or institutional, national, and international. Thus, the registry information can be categorized as follows:

1. Information essentially of local or institutional interest and usually available at that level only;

2. Information of national interest also and usually available at that level;

3. Information of international interest also and available at that level;

4. Information of more or less equal interest at two or more levels; and

5. Information of common interest and required as a minimum at all levels.

Institutional Record in Relation to National ROR Records of research carried out in an institution usually arise from the time a research proposal is prepared. Often, a more or less standard pro forma is used for the research proposals. Subsequent records of an approved research project would usually contain most of the data elements or headings given in the research proposal, of course, with the information given against some of the headings updated as and when necessary. The information record used for reporting on ongoing research in an institution to a national or international registry of current research projects, would have several data elements common to the institutional record. It would, obviously, be economical if the information collection and recording about a research project is done once for the institutional record and this record is used as the data base for preparing subsequent records at all levels. This can be the case if:

a/ the record for national/international purposes does not have too many data elements usually not included in the institutional record;

b/ there is general agreement on the minimum data elements needed in entries in national/international ROR; and

c/ there is a fair amount of uniformity, consistency, and compatibility in respect of data elements in institutional records among themselves and in relation to the data elements in national and international registers.

If there is an appreciable difference in the variety of data elements between the local and national records, then this fact should be taken note of in the local recording such that the national and international requirements are provided for without too much extra effort and cost at a subsequent date.

Normally, the local or institutional research record would contain more headings and details than might be required at the national and international levels. The variation arises from the difference in weighing given to the different data elements at the different levels. For instance, at the local level weighing may be given to data elements carrying information needed for R & D management within the institution e.g. on details of cost and availability of the inputs to the research project, the spin-off, the period that particular personnel of the institution are engaged in the research,etc. On the other hand, at the national level such information may receive comparatively less weighing, and more emphasis may be placed on information helpful in identifying the areas in which research is in progress in the country and whether these areas correlate or are compatible with the priority areas laid down in the national science and technology plan, the pattern of deployment of resources,personnel, finances, etc. in research in the different sectors and so on. Thus, the minute details of local interest are less important at the national level. In fact, a good part of the details on ongoing research recorded at the institutional level may not even be made available for wider use at the national and international levels for reasons of secrecy, patenting possibilities etc.

There is also the question of cost of preparing and maintaining a national ROR for a country as a whole as compared with that for an institution. The Directory of Scientific Research in Indian Universities, 1974, New Delhi, University Grants Commission and Council of Scientific and Industrial Research, lists about 9000 current research projects in the universities alone. At least half that number can be added if the research in other research institutions, industries, etc., and in the social sciences are also included. Even to get periodical and complete information from all institutions, organising, updating, and disseminating information on ongoing research through printed registries and periodical current awareness services, or providing an adequate telecommunication network to central data base would cost a substantial amount. Hence, national and international ROR's tend to give minimal information about ongoing research and direct the enquirer to other sources for detailed information.

3. BASIC QUESTIONS AND ESSENTIAL DATA ELEMENTS

Questions of Common Interest

Although there are differences in interest and emphasis at the different levels, one would recignise that there are some basic questions about ongoing research for which answers may be found at the national /and international/ levels, and that for details one should be able to go to the particular institutions concerned. These basic questions include the following:

1. What research work is being done in the country? /information on the subjects and types of research/;

2. Where is the work being done? /information on institutions where research is carried out/;

3. Who is doing the work? /information on personnel involved in research/;

4. How is the research paid for? /information on sponsorship and financing of research/;

5. When was each of the research projects started and when is each expected to be completed? /information on period of research/;

6. Through which contact points could further details about the projects be obtained? /information for referral and networking purposes/.

Necessary Data Elements

A national ROR, to be effective either as a tool in research communication or for R & D planning, should be as complete as possible in respect to the ongoing research projects in the country, and also should give the minimum recommended details about each project. Completeness of coverage of research projects depends, in a large measure, on the cooperation of the institutions in sending the completed research survey pro forma periodically and promptly to the centre collecting such information. Experience indicates that better response is likely to result if the pro forma can be completed without spending too much time on it. This implies that the number of data elements in the pro forma should be kept to a minimum, should be clearly worded, and adequate instructions given for filling in the pro forma. Therefore, the data elements to be included in the pro forma should be carefully selected so that the minimum information needed about a project and point of contact for further details about it can be quickly obtained from the ROR.The data elements recommended in the UNISIST Guidelines, for a ROR are as follows:

1. Essential data elements which every system should contain:

1.1 Project title

1.2 Name of the researchers

1.3 Institutions with which the researchers are affiliated

1.4 Type of research

1.5 Starting date of project

1.6 Academic degree, if any, for which the project is undertaken

1.7 Key words, descriptive words and phrases.

2. Optional data elements:

2.1 Abstract of the project

2.2 Sources and amounts of financial support

2.3 Citation list of prior related research

2.4 Budget breakdown /salary, equipment, etc./.

The recommended data elements in the input questionnaire are:

1.1, 1.2, 1.3, 1.4, 1.6, 2.1, 2.2

Key words, descriptors, etc., /1.7/ can be derived from the abstract, project title etc., given in a completed pro forma. However, it is not clear why item 1.5, starting date of project, considered an essential element, is not included in the input questionnaire, although the pro forma given in B1 and B2 in the Appendix to the UNISIST Guidelines provide for mention of the starting and completion dates of each project.

Comparison of Data Elements in Some RORs

For a comparison of the data elements in the entries in some RORs, the following have been used:

1. Recommendations of the UNISIST Guidelines mentioned above /UNISIST/;

2. Smithsonian Science Information Exchange, Notice of Research Project /SSIE/;

3. Unesco-International Information System on Research in Documentation; and FID - R & D Projects in Documentation and Librarianship /ISORID/FID/;

4. University Grants Commission and the Council of Scientific and Industrial Research, New Delhi: Directory of Scientific research in Indian Universities, 1974, /UGC/CSIR/.

UNISIST	SSIE	ISORID/FID	UGC/CSIR
1. Essential Elements			
1.1 Project title	x	x	x
1.2 Name of researchers	x	x/1/	x/1/
1.3 Institutions with which the researchers are affiliated	x	x	x
1.4 Type of research			
1.5 Starting date of project	x/5/	x/5/	x/5/
1.6 Academic degree, if any, for which the project is undertaken		x	x/2/
1.7 Key words, descriptors etc.		x	
2. Optimal Elements			
2.1 Abstract of the project	x	x	x
2.2 Sources and amounts of financial support	x/3/	x	x/3/
2.3 Citation list of prior related research			
2.4 Budget breakdown /salary, equipment, etc./	x/4/		

Annotation

1. Indicates Project Leader or Person-in-charge of Project.
2. Records only research for doctoral degree.
   Therefore, information against this data element is omitted.
3. Indicates sources of funds; amount not mentioned.
4. Total budget only.
5. Starting and closing /or expected closing/ dates.

It may be noted that there are several data elements common to the different RORs. The information provided against these data elements are meant to answer the basic questions mentioned in section 3.

4. INSTITUTIONAL RECORD AS PRIMARY DATA BASE

It was mentioned above that an institutional record of research could be conveniently used for providing information for the national ROR. Let us consider some of the data elements and details given in a typical project profile used in a research institution. The data elements mentioned below were selected on the basis of an inspection of such project profile pro forma used in a few research institutions in India. The sequence in which the data elements are considered here is not necessarily the sequence in which they are enumerated in the institutional project profiles.

1. Project title

2. Project description

/A fairly elaborate account of such items as the short-range and long-range objectives, the scope of the research; the state-of-the-art in the subjects, the methodology used, programme of action, economic justification and technical feasibility of project, etc./

3. Status of project

/Indication of type research /e.g. basic, applied exploratory, survey, etc./; priority /e.g. top, first. second. third/; whether the project is an ongoing one or a terminated one/

4. Duration

/Indication of starting date, closing date, and targeted date of completion./

5. Sponsorship

/Indication of the type of sponsoring body /e.g. government, industry, UGC, etc./; name of the organization initiating or sponsoring the project; nature of sponsorship e.g., collaboration, technical know-how provision, financial assistance; expert advice, etc./

6. Personnel

/Name, designation, role in project team, salary, period of involvement in the project, name of organization from which person/s/ may have been seconded to the project, if applicable; royalty payment, etc., for each person./

7. Financial Data

/Detailed breakdown of cost under various heads such as salary, capital, pilot plant, etc., with a number of subdivisions for each./

8. Report

/Name and address of organization to which periodical reports on the status of research are made; citation of papers, patents taken, etc./

9. Link

/Indication of earlier related project; use of output; spin-off, etc., in other projects./

10. Technology Transfer

/Details as to whom, through wich channel, on what terms know-how has been given, if applicable./

11. Project Number

Scope notes on the data elements and guidelines are usually provided to facilitate filling out the pro forma.

From the enumeration of the data elements in a typical institutional research project record given above, it is obvious that the minimum information on ongoing research required at the national/international levels can easily be provided or extracted from such institutional records.

5. STANDARD PROJECT CODE

Some of the institutional records of research examined used a "meaningful" code for identifying a project. The component digits represent some particular attribute of the project. For example, one of the institutions used a combination of the notation for the following characteristics of the project:

1. Discipline in which the subject of the project falls /alphabetic/;

2. Serial number of project in the discipline in the insitution /numeric/;

3. Priority status /alphanumeric/;

4. Nature of sponsorship; government, industry, in-house, etc. /alphabetic/;

5. Nature of research: basic, applied, exploratory, etc. /alphabetic/;

6. Project size: Rs y and above, Rs y to Rs x, and less than Rs x /alphabetic/;

7. Date of starting: month and year /numeric/;

8. Date of completion: month and year /numeric/;

9. Serial number of project /numeric/;

Example: PT-25/P1/G/AR/A/74-04/75-12/725

Where

PT = Protein technology

25 = Twenty-fifth project in the discipline in the institution.

P1 = First priority

G = Government sponsorship

AR = Applied research

A = Project size: Small

74-04= Starting date: April 1974

75-12= Completion date: December 1975

725 = Project number in the institution as a whole.

Given a dictionary for the code, a computer can easily manipulate the different components of the project code number to provide a variety of management information. For example, the number and total cost of government sponsored projects in a particular discipline; projects to be completed by a particular date, etc. For national and international information exchange purposes also similar codes can be constructed. However, there may be items of interest at the local level which may not be necessary at the national and international levels and vice versa. Further, the code for some data elements can and need to be added at particular levels only. The table given below indicates data elements of likely interest or need to be used at different levels in constructing the project code number. Only the minimum data elements mentioned in section 3 /UNISIST Guidelines recommendations/ are considered here.

Data Elements for a Project Number

	Code for	Local code /LSPN/	National code /NSPN/	International code /ISPN/
1.	Country			x
2.	Subject-field	x	x	x
3.	Type of research	x	x	x
4.	Institution		x	x
5.	Sponsorship	x	x	x
6.	Degree for which project is undertaken	x	x	x
7.	Starting date	x	x	x
8.	Closing date	x	x	x
9.	Priority	x		
10.	Project number	x	x	x

Annotation

1. Country. The country code need to be given in the international project number /ISPN/. For this purpose the ISO code for countries may be considered.

2. Subject-field. A widely acceptable code for subject-fields, such as UNESCO's ISN or BSO /when it becomes available/, or FID's UDC can be considered.

3. Type of research. An alphabetic code, such as B for Basic research, A for Applied research, E for Exploratory research, P for Pilot study, S for Survey, etc., may be adequate. An all-numeric code may be an alternative.

4. Institution, Elsewhere I had suggested that an International Standard Institutional Number /ISIN/ could be formulated for use in ways analogous to the uses of ISSN, and ISBN. The ISIN so formulated can be used as a component of the project number.

5. Sponsorship. A code such as G for Government sponsorship, I for Industry sponsorship, O for Own or in-house sponsorship, etc. can be considered. An all-numeric code may be an alternative.

6. Degree for which the project is undertaken, if applicable. A code such as D for doctoral degree, M for Masters degree, P for Post-doctoral work can be considered. An all-numeric code may be an alternative.

7-8. Dates. The ISO Standard for representing calendar dates in all-numeric form can be adopted.

9. Priority. This is essentially of local interest only. A code such as 1 for first priority, 2 for second priority, etc., can be used.

10. Project identification number. This could be an all-numeric serial number assigned nationally to all research projects in each country. The serial number in a local project number may be different.

For a quick reference to and identification of a particular research project at the international level, a combination of the country code, subject code and project identification number will be sufficient. At the national level, a combination of the subject code or institution code and the project identification number will be adequate.

It will be noted that the only difference between the ISPN /International Standard Project Number/ and the NSPN /National Standard Project Number/ is the use of country code in the former. In the LSPN /Local Standard Project Number/, the country and institution codes are omitted, but the priority status code may be used.

There is need for some concensus on the minimum data elements in an entry in a national ROR. There is need for agreement on the notation for representing the data elements. Suggestions using alphanumeric characters given above are merely illustrative. This has advantages as well as disadvantages. A completely numeric code can be developed if that would be more widely acceptable.

If a consensus can be arrived at in regard to the essential data elements to be represented in the project code numbers /ISPN, NSPN, and LSPN/ and the notation for coding, then the code for the selected elements can be assigned in the research record pro forma at the institutional level itself. Additional code components alone need to be added at the national and international levels to make up the NSPN and ISPN /See Section 5/. This arrangement will contribute to economy in work at the national and international levels, and consistency and compatibility between the ISPN, NSPN and LSPN.

6. DATA ELEMENTS FOR CONTACT PURPOSES

The establishment of quick contact with the appropriate organizations and/or persons for obtaining further information or reports on ongoing research projects will be facilitated, if the following items of information are also given in the entries in a ROR.

1. Name and address of the person to be contacted for information on ongoing research.

Normally, the leader of the research team or departmental head would be the point of contact. But this may not be so in all cases. It may be the director of research in the institution or the research guide in the university, rather than any other member of the team who should be contacted. This factor has added importance when the research is carried out in more than one institution.

2. Name and address of the institution/centre to which reports of progress and/or final reports on ongoing research are sent for record, etc.

3. In the case of research undertaken for a degree, the name of the university conerned and name of the guide. This indication is particularly necessary when research is carried out in one instituion and the thesis is submitted for a degree to another institution.

REFERENCES

1. Study on the systems design of a world referral network for science and technology. /A report presented to the second session of the UNISIST Advisory Committee, Paris, 5-9 May 1975. Para 3./

2. NEELAMEGHAN, A. International standard institutional number. /A paper contributed to the Sixteenth Indian Standards Convention /Bhopal/ /Oct. 1975/. Session S-4.

DISCUSSION, Session II, Part 1.

Moderator: Mrs. I. DAHLBERG,
Editor in Chief,
International Classification,
Fed.Rep.of Germany

E. DE GROLIER: Il serait très intéressant de confronter les systèmes de classification et de descripteurs utilisés dans les divers organismes. Pour répondre a M. NEELAMEGHAN qui propose un système unique d'identification des projets, je ne sais pas si on arrivera jamais à un système unique, mais je pense que la confrontation des differents systèmes et des différents descripteurs utilisés, par exemple, en Union Soviétique et au Canada, etc.pourrait peut-être conduire à un meilleur système général de classification et de descripteurs.

V. RYBATCHENKOV: I would completely agree with what Prof. DE GROLIER said. It would be extremely interesting to make this comparison of classification schemes used by different institutions in the Soviet Union and Canada and eventually to see if it would be possible to have a common classification scheme.

A. NEELAMEGHAN: I support what Mr. RYBATCHENKOV said and that is why in my paper I refer to the possiblity of using the BSO when it becomes available.

E. DE GROLIER: Confronter non pas seulement les classifications mais aussi les descripteurs.

I. DAHLBERG: Besides these two approaches just mentioned, there is a more detailed, more specific one, by key words.

P. LÁZÁR: We have to thank Prof. NEELAMEGHAN for his idea of having a little more standardization. In our paper we also mention this point. But, in addition to what has been said, I would like to lay emphasis, not so much on the classification thesauri and the descriptors problem, but on the very simple questions of standardization which are badly lacking. Since, how would it be possible to arrange for international cooperation and exchange of information without having the minimum of input data standardized. We all should think about this and UNESCO/UNISIST should push on ISO in this direction.

L. HENNICO: Il est certain qu'une normalisation à l'échelle internationale est désirable, mais il ne faut pas ignorer les difficultés provenant des différences de conception qu'on peut avoir entre un petit pays et un grand pays, entre des pays d'une région ayant réalisé quelque chose en commun et un pays isolé. Si on n'a pas tellement de projets de recherche, on peut se satisfaire d'une classification, de deux ou trois classifications, même ne décrivant pas très bien l'objet de la recherche. Il est vrai que lorsqu'on voudra interroger la base des données on aura beaucoup de bruits, mais il est possible dans ce cas d'analyser manuellement les quelques dizaines de documents sortis de façon à cerner le projet recherché. D'un autre côté, je crois que la classification entraine malheureusement un très grand problème: si elle permet d'écarter les bruits, il est par contre très douteux qu'elle donne des résultats exhaustifs. Or, un petit pays ne peut guère faire appel qu'à une indexation du genre KWIC à partir d'un titre ou éventuellement d'un résumé. Aller

au-delà me semble impossible, car il ne peut pas se permettre de recourir à une dizaine ou une cinquantaine d'indexeurs de disciplines différentes. Donc, je crois que la seule solution qui s'offre aux petits pays est celle de s'intégrer à des systèmes régionaux à partir desquels on pourra peut-être aboutir à un système mondial.

I. DAHLBERG: This is, of course, also a question of language: what language to use in such a regional system and eventually in a universal or international system. I was particularly thrilled by the idea that was presented by Prof. NEELAMEGHAN to have these three levels of use and three steps for accumulations of data: the institutional level, the national level and the international level. In this case, different criteria for the selection of the research projects are needed. What is interesting for a country might not be interesting on the international level. I would like to have your opinion on this three level approach.

M, EL HADI: There is also the problem of comprehensiveness which has not been considered: How to make most of the research carried out in a country known within the nation itself first, and then on a regional or international scale. The four speakers depended, in their data collection, on voluntary basis rather than on a national network system. For example, is there in the USSR a system of liaison officers connected with VNTIC that will supply data on a regular basis and not only on request? For the Environmental Registry, is there also a network of correspondents in the U.K. or in the different participating organizations? The same question applies to India.

I. DAHLBERG: I think this is a question which might be discussed this afternoon in the panel discussion because it is getting too broad right now.

D.E. TORRIJOS,
Chief,
Scientific Library and
Documentation Division,
National Science Development Board,
The Philippines

Session II
Part 2
Paper 9

Summary

INFORMATION SYSTEMS AND SERVICES IN ONGOING RESEARCH IN SCIENCE: A PHILIPPINE EXPERIENCE

The evolution of the project on the "Cataloguing of Philippine Scientific and Technological Studies" undertaken by the NSDB through the Philippine National Secretariat for ASCA Affairs /Association for Science Cooperation in Asia/ in 1972, which marked the beginning of a systematic approach in the inventory of research and development activities in the Philippines, is presented.

The initial output of this project is a 2-volume work entitled: "Catalogue of Philippine Scientific and Technological Studies" consisting of 967 completed and 798 ongoing research and development studies with a supplement volume on agricultural studies. Another side-output of this activity is the "NSDB-Assisted Research and Development Studies/Activities 1958-1974 Completed and In-Progress" which records the studies conducted by NSDB agencies and those financed by NSDB but conducted in other institutions. The inventories included studies conducted and financed by government institutions and some selected private companies.

The difficulties encountered in data gathering, processing, verification and in the operation and sustenance of the system are discussed. Other constraints, like the difficulty in determining user needs, the reluctance of private companies to divulge their research activities, are presented.

The paper also deals with problems such as standardization of data elements and formats, language problems, especially from some South-East Asian countries, the probable prohibitive cost of such a regional project, the confidentiality of certain research results/data, and the sincerity on the part of national corresponding agencies to submit reliable and complete data on time.

Résumé

SYSTEMES ET SERVICES D'INFORMATION SUR LES RECHERCHES SCIENTIFIQUES EN COURS: UN PROGRAMME MIS EN OEUVRE AUX PHILIPPINES

Aperçu du programme de catalogage des études scientifiques et technologiques aux Philippines, mis en chantier en 1972 sous l'égide du NSDB par le Secrétariat national philippin pour les questions concernant l'ASCA /Association for Science Cooperation in Asia/; il s'agit du premier inventaire systématique des travaux de R & D entrepris aux Philippines.

Ce programme a d'ores et déjà permis de faire paraître, sous le titre "Catalogue of Philippine Scientific and Technological Studies", un ouvrage en deux volumes où sont catalogués 967 projets de R & D dont la mise en oeuvre est terminée et 798 projets en cours, un volume supplémentaire étant consacré aux questions agricoles. On a en outre pu élaborer un répertoire intitulé "NSDB-Assisted Research and Development Studies/Activities 1958-1974 Completed and In-Progress", qui porte sur des travaux exécutés soit par des organismes dépendant du NSDB, soit dans d'autres institutions aux frais de NSDB. Les études recensées sont menées et financées par des institutions publiques et par certaines sociétés privées.

L'auteur expose les problèmes qu'a soulevé la collecte des données, leur traitement et leur vérification, ainsi que la gestion et l'entretien du système, et signale d'autres obstacles comme la difficulté de définir les besoins des usagers et le fait que les sociétés privées sont peu disposées à faire connaître leurs travaux de recherche. Elle examine aussi des questions telle que les suivantes: nécessités de normaliser les données et leur mode de présentation, problèmes linguistiques /notamment dans certains pays d'Asie du Sud-Est/, coût sans doute prohibitif d'un tel programme à l'échelon régional, caractère confidentiel des résultats de certaines recherches et des renseignements s'y rapportant, et degré de sincérité des organismes nationaux qui s'engagent à communiquer en temps utile des données sûres et complètes.

INFORMATION SYSTEMS AND SERVICES IN ONGOING RESEARCH IN SCIENCE: A PHILIPPINE EXPERIENCE

D.E. TORRIJOS

1. Historical Background

Upon the establishment of the National Science Development Board in 1958, serious attempts to undertake a comprehensive inventory of research studies undertaken by various sectors of the Philippine society were made to determine the status of R & D in the Philippines. Realizing the potential of studies conducted in various universities and colleges in the Philippines, a survey of graduate theses was conducted, which produced the volumes:

Compilation of Graduate Theses prepared in the Philippines, 1913-1960. Manila, NSDB, 1962. 437 p.

> This volume consists of 4355 graduate theses classified into 44 fields of specialization. Entries under each major field of study or specialization are arranged alphabetically by author.

Compilation of Graduate Theses prepared in the Philippines, 1961-1965. Manila, NSDB, 1969. 320 p.

> This second volume consists of 1632 graduate theses, classified into 47 fields of specialization. Arrangement of entries and format are strictly patterned after the first volume, except for provision of an author index to facilitate its use.

Corollary to this, the Division of Social Sciences, Humanities and Statistics, NSDB, prepared:

A Handbook of Researches in the Philippines /1964-1965/. Manila, NSDB, Asia Foundation and Philippine Statistical Association, 1967. 460 p.

> This is a compilation of abstracts and/or summaries of researches undertaken for the years 1964 to 1965. The abstracts are classified into 9 major fields of the natural, physical and applied sciences, and arranged alphabetically within a major field according to author. Also included are the following information: type and name of institution,sources of research funds.

A Catalogue of Researches in the Philippines /1966-1969/. Taguig, Rizal, NSDB, 1972 . 1022 p.

> Like the first volume, this compilation of abstracts and/or summaries of researches undertaken in the Philippines for the period 1966 to 1969 was also classified into 9 major fields of the natural, physical and applied sciences and arranged alphabetically according to author.

These, however, failed to elicit enough response from the potential users because of the difficulty of locating or retrieving the desired information. Funding for this kind of activity also became difficult to obtain, mainly because it failed to get into the priority listing of projects included in the national program.

Partly because of this development, when the Association for Science Cooperation in Asia was formally launched and the body showed serious efforts to help each other in harnessing S&T for national development, one of the projects sponsored by the Philippine Government is the "Establishment of a Union Catalogue of Scientific and Technological Studies in Asia".

It is believed that the union catalogue will provide ASCA with a valuable tool for drawing up a systematic regional program on cooperative projects which would be of mutual interest to various ASCA member countries,and provide a sound basis for the mutual sharing of resources, including facilities and technical expertise. With such a regional project, it was felt also that the proper atmosphere for the development of the Philippine national component could be set and its operationalization expedited. And true enough, this move dramatized the importance of this activity and spearheaded many efforts in the Philippines towards a systematic inventory of R&D projects in several sectors of science and technology. Thus, the following studies were seriously undertaken and produced the following:

Project ADAM: An annotated bibliography of selected studies on agriculture, diversification and markets in the Philippines. Quezon City, Bureau of Agricultural Economics, Department of Agriculture /1972/, 9 vols.

> This is a project jointly undertaken by the Bureau of Agricultural Economics, the University of the Philippines College of Agriculture, /UPCA/, U.S.D.A. Economic Research Service and the National Science Development Board, code-name Project ADAM or NSDB-Assisted Project No. 2260. It consists of 9 volumes.
>
> Part I contains abstracts of 856 Philippine studies classified into 14 subject categories: Agricultural Finance and Credit, Agricultural Labor, Wages and Income, Demand for Agricultural Products, Land Economics and Land Reform, Agricultural Policy and Situation, Supply Response, Marketing and Transportation, Farm Management, Production Economics, Diversification Experience, Agronomic Experiment, Geographical Characteristics - Soils, Climate, Demography, Rural Institutions, Trade, Farm Surveys and Primary Sources, and Others /General/.
>
> Part II contains abstracts of 232 non-Philippine studies consisting of 466 pages.

Research in agriculture, forestry and fisheries in the Philippines: On-going research projects. August 1974. Laguna, Philippine Council for Agricultural Research, 1974. 153 p.

> The listing contains the following data elements: Agency doing the research, research leader, source of funds, budget requirements, and the location and duration of the project. This is an off-shoot of the ASCA Catalogue and explains the similarity of the approach.

On the regional level, when the Philippine proposal was discussed during the First ASCA meeting in Manila in 1972, the Philippines was requested to prepare the complete project proposal and from it to develop the required format, questionnaire and data elements for the regional union catalogue to be presented for discussion in the 2nd ASCA meeting in Tokyo. The Philippines therefore came out with a prototype model the "Catalogue of Philippine Scientific and Technological Studies Vol.1: Agriculture" which was presented in the Tokyo meeting. The proposal elicited various reactions, but because of lack of time it was agreed then to take up the proposal again in the 3rd Meeting in India. Comments on the Philippine proposal were received in time for the Third meeting, please see the Annex A. However, because of lack of time, again, no definite stand was taken by ASCA on the regional project.

Meanwhile, the Philippines continued to gather and update the data for the national component to the regional catalog and came out with:

"Catalogue of Philippine Scientific and Technological Studies."
Vol.2: Natural and Applied Sciences /excluding Agriculture/ consisting of 847 studies from 49 government and private institutions and firms, and a Supplement to Vol.1: Agriculture.

The carding of these studies gathered is being done continuously. There are on file 1973 to 1975 data, which we hope to publish in 1976 in time for the Fifth ASCA meeting scheduled in Bangkok in 1976. This will be the Philippine contribution to the regional project. It is hoped that the other ASCA countries will similarly prepare their own national catalogue, so that monitoring of ASCA's joint cooperative projects can be made more systematic and maximally useful to corresponding countries. The computerization of the gathered data is now being undertaken by the National Computer Center for the NSDB.

2. Problems and Methods in the Collection and Processing of Ongoing Research Information

The survey-questionnaire method, which was, as planned, the sole data-gathering method to be used, on account of the limited funds and personnel made available to the project had to be revised and supplemented. Close personal follow-up instead of follow-up by mail alone had to be used due to the poor response originally received. It was found that many of the respondent institutions and researchers had been disappointed in the past by previous surveys conducted, results of which were never relayed to them. In effect, answering surveys has become anathema to most of them and was considered a complete waste of their time. So, ASCAPHILL had to organize a team of interviewers to backstop the data gatherers. In many instances, it was found that data which normally should be systematically recorded, are scattered and incomprehensively recorded. Many take them for granted. The situation led to irritating and annoying experiences for the data gatherers.

Another kind of problem also came out and that is the reliability of data released or given. It cannot be denied that some of the data collected were erroneous, simply because the researcher or project personnel-in-charge was irresponsible enough to release anything at all just to get the whole thing over with. Again, this called for extra perception, diplomacy, and dedication on the part of the interviewers. Extra perception to detect the reliability/accuracy of the data; diplomacy to deal with irresponsible respondents; dedication to go out of one's way most of the time, just to be able to obtain the required information.

If institutions are within easy reach of data gatherers, checking and quality control could be easily done. But if respondent instituions are located a great distance away from the data gatherer's headquarters, follow-ups and checking and control of data can become very complicated.

On the question of evaluation of data/projects to be fed into the system, ASCAPHIL encountered difficulties. Some researchers may be so carried away by their research that a different picture is painted, sometimes far different from the actual results obtained. Here, we question the mental honesty of respondents. To get the proper perspective, we thought of requiring submission of official report on each project, against which the reliability and accuracy of the data could be checked. These reports are then collected to form part of the collection.

On the question of comprehensiveness of coverage, ASCAPHIL encountered difficulties with the private sector. The confidentiality of data and information generated by private firms kept many of them from participating in this activity. It is a question of proving to them that confidential data submitted will be held strictly in confidence. Here extreme care and caution ought to be exercised in order to avoid accidental release of confidential data, especially to potential competitors. Once they feel betrayed, it will be the end of cooperation between them and ASCAPHIL.

Annex A

TABULATED SUMMARY OF COMMENTS/SUGGESTIONS RECEIVED ON THE ASCAPHIL-PREPARED CATALOGUE OF PHILIPPINE SCIENTIFIC AND TECHNOLOGICAL STUDIES: VOLUME I

ASCA Member Countries	Date Received	COMMENTS/SUGGESTIONS
1. India	28 May 1973	1. Considers value of catalog could be enhanced by providing detailed "contents" of subjects covered and presented in classified manner. 2. Institution index should have subject entries in addition to the entry numbers 3. Information collected for each study is adequate and well presented.
2. Australia	7 Nov. 1973	1. Present Philippine Catalog format appropriate for facilitating cooperation within an individual country, but doubts its suitability as a model for a regional union catalogue. 2. Believes there is value in proposal to establish a regional catalogue. 3. Information for a regional catalog should be presented at the research group level instead of research project level, a format adopted for the "Registry of Scientific and Technical Services for the ASPAC." 4. Present ASCAPHIL format and detailed information too costly for a regional catalogue. 5. Questions on costing, benefits that could be derived, and on demonstrated need for the catalogue were raised.
3. New Zealand	29 Jan. 1974	1. Information given too detailed. 2. Research group level approach preferred for a regional union catalogue, as that followed by the Registry of Scientific and Technical Services covering the Asian and Pacific Region undertaken in Canberra. 3. Publishes "DSIR Research", which would be reasonably adequate for providing information on or enabling interested parties to make contacts regarding specific projects.

ASCA Member Countries	Date Received	COMMENTS/SUGGESTIONS
4. Pakistan	14 Feb. 1974	1. Very well designed for coordination of research work at the national level, but not appropriate for listing of R & D activities at regional and international level. 2. Regional catalogue should bring out broad-based problem of national or regional interest at 'research group' level and should not contain minute details at the 'project level'. 3. UNESCO format with minor changes and adaptation could serve the purpose for a regional union catalogue.
5. Vietnam	28 Feb. 1974	1. Considers the establishment of a regional union catalogue highly desirable. 2. Considers some items in the Philippine Catalogue not very essential for other researchers, such as period conducted, where conducted, source of funds, amount given. 3. Suggests that titles of the published results of the researches be incorporated in the catalogue. 4. Will follow whatever prescribed standardized format that will be decided in the next ASCA Meeting in New Delhi.
6. Sri Lanka	1 Mar. 1974	Asked for a copy of the Philippine Catalogue.
7. Republic of South Korea	11 Mar. 1974	1. Considers that the Catalogue would be an efficient tool for scientific information exchange, if all participating countries will publish their catalogues using similar editing method used in Philippine catalogue. 2. Believes the Philippine format is too deep to adopt Korean data and the deeply-processed information file possibly necessitates review of cost-effectiveness. 3. Believes that business competition, especially in the private sector, will limit research reporting and that this limitation will reduce the contribution of the catalogue. 4. Suggests a study group, consisting of a few experts who have experience in the fields of data acquisition, indexing, classification and publication of catalogues, be created to study the design of the optimum system, exact scope of data to be included, analysis of the need for the catalogue and standardization of data processing.

D.W. LAKAMP,
Director
of Programme Planning,
Smithsonian Science Information
Exchange /SSIE/,
USA

Session II

Part 2

Paper 1C

Summary

AN APPROACH TO THE PROCESSING AND DELIVERY OF ONGOING RESEARCH INFORMATION

The Smithsonian Science Information Exchange /SSIE/ has been engaged in the collection, classification an dissemination of ongoing research information for over 25 years. During this period, SSIE's operations have evolved from the maintenance of a manual file containing project descriptions in the Medical Sciences funded solely by U.S. Federal Agencies, to a fully computerized system covering all major scientific disciplines. At present, more than 125 000 Notices of Research Projects /NRP's/ sponsored by over 1300 supporting organizations are processed into the system each year.

The paper discusses this period of growth from the point of view of the major problems which have been encountered, /the need for the system; the selection of key data elements; difficulties in the collection of data; information classification and retrieval; methods for encouraging use/ and the manner in which these problems have been addressed. In the name context the characteristics of the present system and the methods applied to its operation are described.

Finally, the paper reviews the range of applications of the system which have been developed in response to the information needs of the scientific community.

Résumé

TRAITEMENT ET COMMUNICATION D'INFORMATIONS SUR LES RECHERCHES EN COURS: UN MODE D'APPROCHE

Le Smithsonian Science Information Exchange /SSIE/ se consacre depuis plus de 25 ans au rassemblement, à la classification et à la diffusion d'informations sur les recherches en cours. Pendant cette période, le SSIE est passé de la tenue d'un fichier manuel contenant des notices descriptives de projets entrepris dans le domaine des sciences médicales exclusivement avec des fonds des organismes fédéraux des États Unis à un système entièrement automatisé portant sur la totalité des grandes disciplines scientifiques. Actuellement le système s'enrichit chaque année de plus de 125 000 notices de projets de recherche /NRP/ patronnés par plus de 1300 organisations.

Etudiant cette période de développement, l'auteur expose les grandes difficultés rencontrées /nécessité du système,séléction des principaux éléments de données, problèmes posés par le rassemblement des informations, la classification des données et la recherche documentaire, moyens de promouvoir l'utilisation du système/ et la manière dont ces difficultés ont été abordées. Dans la même optique, il décrit les caractéristiques du système actuel et son mode de fonctionnement.

Il passe enfin en revue les différentes applications du systeme qui ont été mises en place pour répondre aux besoins d'information des milieux scientifique.

AN APPROACH TO THE PROCESSING AND DELIVERY OF ONGOING RESEARCH INFORMATION

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Introduction

The Smithsonian Science Information Exchange /SSIE/ was established in 1949 to facilitate the planning and management of medical research in the United States through the timely exchange of information on research in progress. In its first year of operation, SSIE collected, indexed, and stored for retrieval information on approximately 3000 research projects, and it served as a central point of exchange for the six agencies of the Federal Government then engaged in the conduct and support of research in the medical sciences.

Over the years, SSIE has expanded both the scope of its coverage and the extent of its services. Today, the Exchange annually processes information on more than 125 000 basic and applied research projects in all areas of the life, physical, social, behavioral, and engineering sciences. This information is registered with SSIE by some 1300 Federal and non-Federal organizations. It is indexed by a professional staff of 45 engineers and scientists with a collective background of advanced education and research experience which spans the subject coverage of the data base. The information is stored in an automated file for both batch and on-line retrieval in response to a wide variety of requests from a user community of more than 10 000 organizations in the U.S. and overseas.

Within the historical evolution of the Exchange, from the inauspicious beginning as a small, manual file to its operation now as a fully computerized national system, there lies a host of problems, many of which are likely to be inherent in the development of any system of its kind, regardless of size or scope of coverage. It is to these problems that one must initially turn in seeking to identify principles which might be generalized in a way in which others can profit by the mistakes SSIE has made in dealing with them.

The discussion which follows attempts to review the most significant of these problems from the perspective of SSIE's operational experience. It is presented in the hope that it might serve to encourage the trend, evidenced by the high degree of interest in this meeting, toward the establishment of new and more systematic means of processing ongoing research information, and that it might contribute, in some small way, to the efforts of those already working to do so.

The problems fall more or less neatly into five principal categories:

- establishing the nature and extent of the need for the system;

- identifying essential data elements;

- collecting the information;

- selecting a method of classification and retrieval; and

- encouraging use.

It is in terms of these categories that the elements of SSIE's experience thought to be of common concern are addressed in the remarks which follow.

Need for the System

SSIE's origin can be traced to the recognition by medical research managers in the Government that avoidance of unwarranted duplication of effort required the timely exchange of information on research in progress, and that this purpose would best be served by providing for its collection, processing and dissemination through a central, but independent, organization. As the Exchange began its operation, it also quickly became apparent that the effectiveness with which the research management needs of the original agencies would be met was directly related to the comprehensiveness of the information available. As a result, the data base was expanded at the very beginning to include the programs of private fund-raising organizations and foundations supporting research in the medical sciences. And, from the beginning, search services were extended to individual investigators. None the less, in its early years of operation, SSIE functioned primarily as a research management tool.

In later years, however, the nature of the need for information on research in progress changed. Beginning in the late 1950's, the growth of "Big Science" in the U.S. brought with it an erosion in the effectiveness with which the traditional methods of scientific communication had served the ongoing research information needs of the scientific community /1/. This erosion was characterized by:

- a widening of the gap between the time work on a research project began and the time its results were formally reported; and

- an increasing dispersion of the once closely knit "invisible college", within which knowledge of the current research activities of one's colleagues was an implied benefit of membership.

This latter point is subject to some dispute, particularly among scientists with established reputations, but SSIE's experience has shown time and again that claims to the knowledge of all of the important work in one's field simply do not stand up against the results of searches of the SSIE data base.

It is also useful in this context to keep in mind that the major trends in modern science - the pursuit of inquiries which cross the boundaries of the traditional scientific disciplines, the evolution of areas of ever-greater specialization which nevertheless draw researchers from disparate fields; and the vast increase in the sheer number of active scientists around the globe - all work against the likelihood that the invisible college can continue to function as a primary means for maintaining an awareness of ongoing research and thereby serve to enhance communication among scientists with active interests and problems in common. Indeed, it is doubtful that the invisible college has effectively met this need for some time, and it is the recognition of this that has caused an increasing number of individual scientists to turn to SSIE as a means of doing so.

The nature of the need for systematic access to information on ongoing research within the United States consists, therefore, of two basic elements:

- a need, on one hand, for a means to avoid unwarranted duplication of effort; and

- a need, on the other, for a means of enhancing scientific communication among members of a widely dispersed research community.

Although the first of these falls primarily within the domain of the research manager and science policy maker, and the second primarily within that of the individual investigator, both elements of need exist, albeit at different levels of intensity, for both groups. They thus tend to be mutually interactive in a manner which reinforces the value of ongoing research information as an available resource.

These same elements of need clearly apply to international systems as well as to large-scale national data bases. We would suggest that they can also be expected to apply to smaller-national systems, even in countries in which the national scientific community is able to maintain effective networks of personal communication. This is true if for no other reason than because both the orientation of science in the modern world and the nature f the problems science seeks to solve transcend national boundaries. The nitiative for the development of national systems may come, as it did in the U.S., from the research manager, and it may derive from essentially national needs. But, to the extent that these systems eventually respond as well to the needs of the individual scientist for more effective means of fostering the cross-fertilization of creative ideas, and to those of the science policy maker concerned with the advancement of international scientific cooperation, they can be expected to extend, for mutual benefit, to the support of larger networks of international exchange /2/.

Selection of key data elements

Data element requirements for SSIE were initially established by a review committee composed of representatives from the six founding Federal Agencies. The committee had as its objective the identification of essential system output requirements and the translation of these into a list of essential data elements which would not only meet the requirements but would also minimize data collection and centralized processing efforts. The committee selected the following data elements:

- Supporting organization name;
- Grant, contract or project identification number /for intramural research/;
- Principal and co-investigator names and their departmental affiliation or field of specialization;
- Performing organization name and address;
- Period of performance;
- Project funding;
- Title of the research project; and
- Summary description of the work to be performed.

To these, SSIE added a unique accession number for the purpose of processing control, and over the years adjustments have been made to accomodate special problems. A means had to be found to deal with research projects supported by more than one organization, for example, and as it became clear that continuing projects would require updating on an annual basis, it was necessary to redefine period of performance and project funding to mean "for the report period," rather than "for the life of the project." This change was made in order to preserve an ability to compare funding levels in particular areas of research from one Government fiscal year to another.

These particular data elements continue to present problems, however, which SSIE is still in the process of attempting to resolve. Irrespective of annual funding, it is desirable to reflect the entire period of project performance on output documents in order to provide the user with a means of placing the current effort into the broader perspective of the life of the project, and steps are now being taken to make the changes necessary to restore this feature to the SSIE system.

Project funding information is a more difficult concept to deal with from the point of view of a centralized data base. The following set of funding-related problems indicates why:

- Project costs associated with Government in-house research are often either not available or are assigned on a different basis than are costs assigned to performance under a contract or grant;
- Project performance is often unrelated to the year in which funding is awarded, a condition which requires either an arbitrary proration of funds or an assumption that from one year to the next, the impact of this difference on overall funding in any single field is insignificant;
- The use of Government Fiscal Year as a fiscal standard is complicated by research registered as it is at SSIE, by private sources of support operating on the basis of different fiscal years; and
- Reported costs can vary significantly from initial funding, a condition which requires either a significant number of administrative changes during the course of the year or an assumption that in the aggregate the differences are inconsequential.

In spite of these difficulties, the level of funding serves as an important indicator of the level of effort associated with a particular research project. For this reason, in the absence of changes which would make the funding information in the SSIE system even more useful, SSIE advisors have continued to insist on the necessity of the availability of project funding as an integral part of the project record.

Although SSIE's data elements have been subjected on a number of occasions to careful review and evaluation, they have, with one exception, remained basically unchanged since they were first established. Recently, in response to the growth in the use of its system as a referral service,and in order to provide users with a point of access to the bibliographic literature, SSIE has begun to request as a part of the registration process identification of recent publications of the principal and co-investigators which bear on the subject of their current project. These citations, reported to the Exchange primarily in connection with projects which have been active for a period of years, are now being registered as an integral part of the project summary.

Of the data elements in the SSIE system, it is the project summary which has been subjected to the most carefuly scrutiny. The preparation of a narrative description, its processing and storage, and its reproduction on retrieval represent major items of cost which clearly require special justification. Initially, the organizations which established SSIE provided this justification, based on their need:

1. for access to the information at highly specific as well as very broad subject levels, a need which could not be met through subject indexing of the limited information contained in a project title; and
2. for sufficient narrative detail, at the project level, to allow the research manager to identify similar efforts and take steps to insure that undesired or unwarranted duplication did not occur.

Since then, an increased use of SSIE as a means for enhancing scientific communication has made the narrative summary even more important, because in its absence, the information available about a particular project is insufficient to allow the scientist to judge whether personal contact with a colleague might be desirable. Equally important, as the system has grown to its present size, the ability of SSIE to continue to retrieve information in response to the highly specific subject requests it receives has been dependent on the depth of indexing it has been able to apply, largely through the availability of project summaries for subject analysis.

As a consequence, as costs have risen over the years, SSIE has undertaken to reduce the impact of the cost of processing project summaries on its total cost of operation. Through technological improvements, such as the compaction of narrative text, application of IBM's virtual storage system software, and the use of video display terminals for on-line data entry and correction, SSIE has actually reduced the unit cost of input processing to a point where its input costs are among the lowest found in any comparable system. By doing so the Exchange has been able to continue to maintain a level of quality and continue to operate in a manner believed to be best designed to meet the needs of its broad-based user community.

Collecting data

Registration of ongoing research information with SSIE was established by the founding Federal Agencies as an integral requirement of the research grant application process. Then, as now, agency registration of input to SSIE was on a voluntary basis: individual participation, once an agency decision had been made, was not.

SSIE was able to expand its coverage to private fund raising organizations and, over time, to the balance of the Federal Government in other areas of science, by convicingly making the point that the value of the system to all related directly to the comprehensiveness of the data base and, therefore, to the active participation of all organizations engaged in the conduct or support of research activities. This argument has been generally persuasive, except where interests of national security or of a commercial proprietary nature intervene.

Lacking a sweeping requirement for mandatory input, which clearly has advantages over the present system, SSIE has demonstrated that ongoing research information can be collected on a voluntary basis. The major disadvantage of the voluntary approach is that it presents a built-in-dilemma - the ability of an ongoing research information system to elicit the registration of project information is at least partially dependent on its ability to demonstrate a degree of value, which in turn is dependent on the extent of coverage the system offers. It is also a costly approach owing to the continuing necessity to maintain close relationships with the large number of diverse organizations and organizational sub-units responsible for supplying the information.

SSIE has been able to meet this necessity on an ad hoc basis, largely through the assistance of an active and supportive Advisory Council composed of representatives drawn from policymaking levels of large user/supplier organizations, most of which now have internal requirements governing the registration of information with the Exchange. Nevertheless, liaison problems inevitably occur when reorganizations take place or when key staff members leave the organizational units responsible for furnishing input. In an attempt to circumvent these problems, SSIE has recently initiated, with a number of Federal Agencies, negotiations aimed at formalizing input policies. Whether these efforts will succeed remains to be seen, but the prospects at the moment appear promising.

It is difficult to judge the extent to which a government-wide requirement for mandatory input would improve the comprehensiveness of SSIE's coverage of the Federal research program in the U.S. This requirement would be unlikely to result in exhaustive coverage, however, for a number of reasons. In the pluralistic and diverse environment in which SSIE operates, new source of input, both governmental and private, are continually being identified, and mandatory registration would not completely eliminate the need for continuing cooperation and liaison. Nor would it solve the problems inherent in defining what constitutes appropriate material for registration. SSIE currently seeks, for example, to register only basic and applied research, but it is seldom clear where applied research ends and development begins. And, research budgets in large organizations often include programs, such as travel grants, fellowships, and equipment acquisition, which at best are of marginal interest to SSIE users. In the absence of universal comprehensiveness of coverage, SSIE efforts are directed toward making the data base as complete and as timely as possible.

There is one other aspect of the data collection process which deserves mention, primarily because it represents a real concern to ongoing research information systems in formative stages of operation. We refer here to the impact of data collection on the individual scientist in terms of his possible objection to the requirements of the system as either an abridgement of his academic freedom or a potential source of premature disclosure of information in a highly competitive research environment.

With respect to the issue of academic freedom, most research conducted outside industry in the U.S., including most university research, is now carried out under public support of one form or another /3/. A requirement for registration of a research project with an ongoing research information system as a condition of funding may seem to be a bothersome administrative imposition, but under the circumstances, it is one which has little to do with the issue of academic freedom.

With respect to the possible misuse of the information registered with the Exchange, narrative summaries covering research objectives and the approach to be used can be, and in fact are, written in ways which are informative, descriptive, and useful without disclosure of information which must be protected. In its twenty-five years of operation, no instance of scientific misuse of information obtained from SSIE has ever been brought to our attention, and it is, parenthetically, reasonable to assume that any such instance would have been, and forcefully so. In any event, whatever initial reluctance might have existed in the U.S. to the registration of information on research before the results reached the publication stage seems now to have been largely overcome, as more and more scientists have recognized the value of contributing information on their own projects in support of a system designed to stimulate scientific communication and information exchange.

Classification and retrieval

At the time SSIE was originally established, two principal system requirements were identified to guide the Exchange in its selection of a method of subject indexing:

- A requirement for a built-in flexibility sufficient to allow for index development, on an empirical basis, to a degree of specifity which would be controlled by the content and the volume of information actually processed; and

- A capability for reliable retrieval at both broad and very specific subject levels.

These requirements led SSIE to initiate the development of a series of independent, hierarchical subject indexes, each of which would be designed to represent all work in a given area, arranged from broader to narrower scientific concepts. Main index categories were established which could be divided into up to five hierarchically ordered subcategories. These divisions were neither predetermined nor theoretical, but, rather, were made on the basis of the sicentific content of the project summaries actually processed, the volume of information indexed against any single category, and the nature of the requests made by SSIE users.

Not only did this approach meet the basic requirements established for the system, it had the additional advantage of allowing SSIE to avoid the expense of indexing to a depth greater than that actually dictated by the subject matter of the information processed. The Exchange was thus able to depend from the very beginning on scientists with graduate level training and actual research experience to provide subject indexing of a quality necessary for the development and maintenance of an essentially empirical classification system.

An inverted filing system was established based on the hierarchical nature of SSIE's subject indexing. Manual files were set up for each index point in the system, and all projects indexed to a particular term were stored for retrieval against that term by physically incorporating copies of the project record in each file. On retrieval, the appropriate file was screened by the science staff for relevance to a particular request, and copies of the project records selected were compiled for transmittal to the project records selected were compiled for transmittal to the requester.

The most significant aspect of SSIE's indexing and retrieval system is that it not only served the operation of a small, manual system, but that it has functioned, essentially unchanged, through a series of steps toward automation and a period of dramatic growth in the size of the file. In fact, in 1963, a year in which the annual processing volume exceeded 50 000 project records, full automation of the system was effected without the loss of a single day of processing.

SSIE has been challenged on a number of occasions on the issue of the tradeoff between the benefits derived from the use of a professional staff of scientists and engineers for indexing, index development, and retrieval and the now rapidly rising cost of scientific expertise. The benefits are well known and of great significance: consistent indexing across disciplinary lines; the capability for indexing scientific concepts which are only implied in the text of a project description or report abstract; the ability to manage an open-ended series of hierarchical indexes which can be modified as rapidly as new concepts appear or old ones become obsolete and which can be used to retrieve information at as broad or as specific levels as are required; the availability of a scientist intermediary between the user and the system; and the flexibility to respond to a wide range of user and the system; and the flexibility to respond to a wide range of user needs for information.

In spite of these benefits, however, the cost of maintaining a professional staff remains a key consideration, particularly so in light of the effects of the extremely high rates of inflation of recent years. Here, again, SSIE has been consistently successful in developing a series of system improvements which have had the effect of minimizing the costs of the indexing process and have allowed the Exchange to maintain a desired level of scientific quality. These include on-line applications used to support index development as well as retrieval efforts, and a system of machine-assisted indexing /4/ which equates words and word combinations in the title and text of project records to the appropriate categories of SSIE's subject index hierarchies prior to scientific review and refinement. This system is based on a unique "classifying dictionary" which was developed by the professional staff and which is continually being updated and improved as an integral part of the review process.

Encouraging use

On the surface, "encouraging use" of an ongoing research information system may not seem to be an appropriate descriptor of a category of problems of common concern. But, closer inspection of the relationship between the elements of need for the system, the cost of its operation, and the extent to which the system fulfills the requirements of its actual and potential user communities reveals that a reasonable balance can be difficult to maintain. This is true, or in any event has been true in the case of SSIE, for the following reasons:

- Effective use of the system by its original users creates pressures for more comprehensive and timely coverage;

- To the extent that the system responds to these pressures and the file expands in size, the requirements for and costs of classification, storage, and retrieval increase;

- The resulting burden on the resources available for system operation becomes increasignly difficult to justify in terms of its use by the limited user constituency originally served.

Expanding use of the system over time can thus easily come to be viewed as both natural and necessary, although it is clear that increasing the level of service provided further increases the costs of operating the system. And therein lies the problem, for without additional resources these very nearly inevitable pressures on the system cannot be relieved.

This means that the likelihood is high, for all but the most restricted systems, such as those intended to cover no more than the research program of a single agency, that the cost of providing ongoing research information services will rise in response to natural pressures, and that either these increases will have to be justified in financial management terms to those providing the operational resources, or some means will have to be found to partially allocate costs to those who benefit from use of the system. It is clear that the former case can prevail as long as the sources of support and use derive from essentially the same organizational entity. When services are more widely extended, however, from a single agency of government to all others, for example, or from national to international user groups, it is less clear that budgetary pressures on the source of support will not force an attempt to allocate some of the costs of the system to the outside users who benefit from its services.

Certainly in the United States, and increasingly in Western Europe, budgetary considerations are leading more and more to the assessment of fees for the use of scientific and technical information, and the ongoing research information system is not necessarily exempt from this trend. What must be avoided, however, are the inherent dangers of commercialization at the expense of service and the possibility of loss of access to information by those simply not in a position to pay for it regardless of the extent to which its value exceeds its cost.

SSIE was able to provide services whitout charge to all users, both within the U.S. and abroad, for a period of 18 years. But in 1968, it was required to implement a system of user fees, because the Office of Management and Budget would not continue to support the rising costs of operating the system, in spite of the fact that the increases could easily be justified in rational terms. Since that time, SSIE has had to charge its users at rates sufficient to cover the costs of delivery of output services. Input and system maintenance activities have continued to be supported through SSIES's Congressional appropriation.

Neither the Exchange nor its principal users were prepared to rapidly adjust to the implications of this change in policy, however, and a number of difficulties were encountered during the early years of its implementation. Predictably, use of the system declined significantly when user fees were introduced. Acceptance of what then was an essentially new concept took time and required unanticipated budgetary accomodations on the part of SSIE users. Nor was provision made in SSIE's budget allocation for the initiation of the major effort which was clearly called for under the circumstances to expand knowledge of the availability of the SSIE system and the value of its services.

As a consequence, SSIE was able to develop this effort only very slowly, and only in recent years has its level of usage exceeded that reached in the late 1960's. In the interim, critics of the Exchange pointed to its low usage rates as evidence of their contention that the cost of maintaining the system could not be justified on the basis of its use.

Over the past two years, however, this criticism has been answered by the Exchange with a three-fold increase in services. This success has been brought about through the realization, over time, of the results of the efforts SSIE was eventually able to put into encouraging use. These efforts were developed in the form of an iterative process which encompassed:

- Determining the ongoing research information needs of the SSIE user community /5/;
- Examining the relative effectiveness of existing services in meeting those needs; and
- Designing and implementing alternative ways of improving the ability of the Exchange to do so.

The process is continuous, and it carries with it a potential for building on its own results. To date its execution by SSIE has had the effect of improving the awareness of the research community of SSIE's ability to meet its information requirements through the delivery of traditional system services and of serving as the driving force behind the opening of new avenues of access to and new uses of the data base.

Conclusion

SSIE has long held the view that the systematic collection and dissemination of ongoing research information is an activity which serves as an important and integral component of the research process. Certainly the need for this kind of information is greater and more global than it has ever been in the past. The cost of science is continuing to rise and scientific communication is becoming more and more difficult to sustain. The information needs which are emerging as a result are causing an increasing number of national and international organizations to move toward the establishment of systems for the processing of information on research in progress. As these systems develop, the demand for an increasingly international exchange of this information will surely rise.

It is this perception which has led the Exchange to maintain a longstanding interest in the development by others of systems similar to its own. Within the constraints imposed by operational requirements and limited resources, SSIE has consistently endeavored to provide encouragement and assistance to those concerned with the problems involved, regardless of the size of the system or the extent to which its operation paralleled that of the Exchange. And, we hope in the future, to be in a position to develop an even more extensive capacity for technical support than has been possible in the past.

REFERENCES

1. GARVEY, W.D. and GRIFFITH, B.C. Communication and Information Processing within Scientific Disciplines: Empirical Findings for Psychology. Information Storage and Retrieval. 8, June 1972, p.123-136.

2. This argument has also been advanced by Wollman, although in a slightly different context, in his consideration of the problem from the perspective of the Israeli experience with a national system of approximately 10 000 projects. See: WOLLMAN, P. Guidelines on the Conduct of a National Inventory of Current Research and Development Projects. Paris, UNESCO,1975.

3. REAGEN, M.D. Science and the Federal Patron. New York, Oxford University Press, 1969, p.11-33.

4. For a full description of this system and its operation at SSIE, see: HUNT, B.L., SNYDERMAN, M. and PAYNE, W.H. Machine-Assisted Indexing of Scientific Research Summaries. Journal of the American Society for Information Science. 26, 4, July-August 1974, p. 230-236.

5. A comprehensive delineation of the uses to which the ongoing research information data base are put is contained in WOLLMAN, P.: Op.Cit.

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Session II

Part 2

Paper 11

Summary

INFORMATION REQUIRED BY SCIENTISTS, RESEARCH MANAGERS AND SCIENCE POLICYMAKERS FOR CONDITIONS IN THE SUDAN

The paper endavours to critically analyse the applicability of certain international recommendations on use of documentation in Science Planning to conditions prevailing in a least developed country like Sudan.

For this purpose some indicative facts about the current socio-economic development plan are given as well as plans for use of science and technology for development.

It is stressed in the paper that for ongoing research and for a science plan to be formulated and implemented, scientific documentation and information play a central role and in certain cases their lack can be detrimental.

International recommendations on the subject are proposed to be adapted to the particular situation under consideration and hence an attempt towards certain concluding guidelines for promotion of scientific documentation under conditions in Sudan is made.

Résumé

L'UTILISATION DE LA DOCUMENTATION POUR LES RECHERCHES EN COURS ET LA PLANIFICATION SCIENTIFIQUE DANS LES CONDITIONS PROPRES AU SOUDAN

L'auteur de l'exposé s'efforce d'analyser dans un esprit critique, dans les conditions propres à un pays peu développé comme le Soudan, certaines recommendations internationales sur l'emploi de la documentation pour la planification scientifique.

A cet effet, il donne des indications sur le plan actuel de développement socio-économique ainsi que sur les plans relatifs à l'utilisation de la science et de la technologie au service du développement.

Il souligne que la documentation et l'information scientifiques jouent un rôle capital pour la formation et la mise en oeuvre d'un plan scientifique et pour la recherche et que l'absence d'information peut, dans certains cas, avoir des répercussions néfastes.

L'auteur propose d'adapter les recommendations internationales en la matière à la situation particulière de son pays et s'efforce donc d'exposer en conclusion certains principes directeurs en vue de la promotion de la documentation scientifique dans les conditions propres au Soudan.

INFORMATION REQUIRED BY SCIENTISTS, RESEARCH MANAGERS AND SCIENCE POLICYMAKERS FOR CONDITIONS IN THE SUDAN

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Geopolitical Setting of Sudan

Sudan is situated at the north-eastern part of Africa and lies, roughly, between latitudes 4° and 22°N and longitudes 22° and 38°E. The total area of the country is 2 505 813 sq. kilometres and the population is estimated at about 17 million, calculated on the basis of the 1955/56 population census, with an annual rate of growth of 2,5%.

The population age histograms reveal a population distribution /by age/ tending to shift the centre of gravity of the population polygon towards the younger ages. 46,6% of the population under 14 years old, while people with an age of 60 years and over constitute a small proportion of only 3,4%. Notwithstanding the comparatively high population growth rate of 2,2%, Sudan is rather sparsely populated with a mean density of population of 7 persons per square kilometre.The actual density of population assumes a maximum in the central parts of the country, where the rainfall varies between 200 and 800 mm per year, thus concentrating the main agricultural activities in this area.

The density progressively diminishes north of Khartoum /lat. 15°N/ where the rainfall drops to almost 0 mm on the most northern part of the country where the desert is the predominant feature. On the other hand, the swamps and dense forests of the Southern Region exclude a huge area for a natural habitat of man and his cattle, the tse-tse fly and other insects breeding in large areas of this part of the country render these parts uninhabitable both for man and animals.

The population of the Sudan is mainly rural with not more than 25% of the total population living in urban centres, of which the three towns of Khartoum, Omdurman and Khartoum North, constituting the Capital, are singled out as the largest urban settlement with a population approaching one million.

Since the proclamation of independence on the 1st of January, 1956, the Sudanese society has been undergoing considerable transformation and change, and the past six years, since the May Revolution of 1969, have been particularly dramatic in socio-economic development.

The political solution /in March 1972/ to the 17 years of strife and armed conflict between the North and the South is indeed a landmark in the struggle of the whole nation for unity and socio-economic progress.Material resources, both national and international, can now be mobilised to the development of the country.

Some General Socio-economic Indicators

The total labour force exceeds four million, out of whom 85% are engaged in agriculture.

Of the 2,1 billion dollars /at 1970 market prices/ making the G.N.P. of the country, 40% is contributed by the agricultural sector alone. Industry contributes about 13% of the G.N.P., and the G.N.P. per capita is 130 dollars at present, with a steady annual growth rate during the last four years, in real terms, of about 1%.

The export earnings come primarily from cotton /60% of total export earnings/, followed by oil seeds /20%/ and gum arabic /10%/. The rest is contributed by live animals, meat and hides, and some other minor export commodities. Those export earnings amounted to about 330 million dollars in 1970 /1970 prices/ and the primary products/export earnings ratio was 99,9. The debt service ratio in 1970 was 8,7, while the domestic savings/national income ratio in the same year was 16. The merchandise imports/exports ratio in 1969 was 107,2. Between 1960-1969, the annual average export growth rate was 2,6%.

From the above indicators, borrowed partly from IBRD data, it can thus be concluded that Sudan is still qualified to be amongst the least-developing 25 countries of the world, 16 of which are in Africa.

Educational Indicators

The third necessary condition for Sudan to be categorized as a least-developing country /the other two being the G.N.P. per capita and the contribution of industry to G.N.P./ is the level of education.

We state briefly some educational indicators borrowed from UNESCO Statistical Yearbooks of 1971 and 1972.

The school enrollment adjusted ratios for first and second levels /6-18 year olds/ by 1969 was respectively 25% and 9%, with an annual growth rate between 1960-69 of 8,2%.

In the third level of education, the total teaching staff in 1969 was 1140, while the total enrolled students during the same year was 11 833, making a staff/student ratio of about 1:10,4.

The number of students per one million population was 770. About 3580 students were studying abroad in 1969.

The total public education expenditure in 1967 was 4,9% of the G.N.P. and 20,3% of total government expenditure; 26,0% of which went for the third-level education.

The illiteracy proportion in 1909 was about 82%.

Renewable Natural Resources of Sudan

Sudan is rich in land and water resources. The climatic conditions varying from 0 mm of rainfall in the North to about 1400 mm in certain parts in the Southern region, favour the development of a diversified agriculture and livestock. Of the country's total surface area of about 600 million acres, 200 million acres are cultivable land, 57 million acres are pasturable land, 218 million are forest, and the rest is not suitable for agriculture. Only about 17 million acres /3% of the total land area and 8,5% of the total cultivable area/ are at present cultivated: 3,4 million of which is irrigated by gravity and pumps from the Nile and its tributaries and the rest is rain-fed.

The main water resources are made up from the Nile, with its main feeders /the White and the Blue Nile and their tributaries/, the rains and the underground water. It is estimated that the water available to Sudan from the Nile system will be enough to meet the requirements of the Sudan for its planned agricultural development for only a few years to come. The domesticated animal wealth in Sudan is estimated at about 40 million, and serious attempts are being made to develop this wealth. The wild life of the country constitutes yet another huge resource.

Non-Renewable Natural Resources

Quite a number of mineral occurances have been recorded in various parts of the country, but few of them were studied in sufficient detail to permit an economic assessment. Excavations for natural gas and oil are going ahead and the indirect evidences of their occurence are encouraging. Geological mapping of the country is proceeding rather slowly due to the insufficient staff of geologists, who number around a hundred for the whole country.

The Place of Scientific Research in the Development of the Country: Some Historical Background

Scientific research in its modern sense started in the Sudan at the beginning of the twentieth century with some limited efforts to improve standards in various commodities and raw materials, together with some routine services and quality control.

The British administration established a veterinary quarantine unit in 1900 within the then Military Veterinary Department, and this unit undertook the study and treatment of some endemic diseases in animals, notably rinderpest.

In 1902 the Wellcome Laboratory was established which undertook various activities in the sphere of control of epidemics and pests attacking humans as well as animals and plants. This laboratory managed to deal with some endemic diseases such as bilharzia.

The year 1904 witnessed the establishment of the first independent unit for agricultural research. This unit was attached to the Department of Education in 1912, and maintained close cooperation with the Wellcome Laboratory. By 1919, the agricultural research unit had become the Department of Agriculture, although its efforts were basically restricted to the control of quality in crops and their protection against pests.

In 1924 the Kitchener School of Medicine was opened. This was to join with other sections of the Gordon Memorial College in 1951, to form the University College of Khartoum.

The year 1938 represents an important milestone in the history of scientific research in the Sudan, with the establishment of a school for veterinary science and a school for agriculture. These, later to become the Faculty of Veterinary Science and the Faculty of Agriculture, helped greatly to enrich scientific research by providing qualified personnel and by developing programmes and methods for scientific research.

Activities in scientific research, however, were not restricted to medicine, veterinary science, and agriculture. With the passing of time, many efforts were being made in the fields of pure science, of engineering /with all its different branches/, of industry, of food processing, of building, of geology and mining, as well as in the fields of economics, sociology, and the humanities. As a by-product of these efforts, non-governmental scientific societies came into being and flourished. At the present moment there are no less than fourteen of these, issuing Sudanese scientific journals and holding conferences and practical seminars.

The Independence of the Sudan at the beginning of 1956 witnessed the start of a new phase in the quality and in the quantity of scientific research. In that same year, the University College of Khartoum became a fully independent University granting internationally recognised academic degrees and furnishing scientific researchers with more and better facilities, and with opportunities for scholarships, both governmental and non-governmental, at universities and higher institutes abroad. More than that, it contributed greatly by providing the country with experience in the different branches of modern knowledge.

Scientific research stations for agriculture and for animal husbandry now multiplied, spreading all over the country. There flourished the seeds of a general survey of the potential of the Sudan and of its natural resources, fostered by the ties of cooperation with friendly countries and with international organisations that were steadily strengthening.

All of this contributed to the modernisation of production, to the creation of an industrial base, and to the widening of opportunities for training. Such are, very briefly, the positive aspects of the activities in scientific research in the Sudan. On the other hand, however, there were some glaring shortcomings, which can be summarised as follows:

1. In spite of the political changes taking place in the country in the wake of independence, and in spite of the consequential changes in strategy concerning development and education in order to cope with the aspirations of a newly independent nation looking forward to modernization, scientific research, in its programmes and objectives, did not keep up with the pace of these political changes. Scientific research remained behind, suffering from an inertia that continued for quite some time, with the result that its eventual modernization called considerable effort.

2. The presence of specialised scientific research bodies in each of the various ministries and institutions produced some harmful duplication that drained much of the meagre material and human resources.

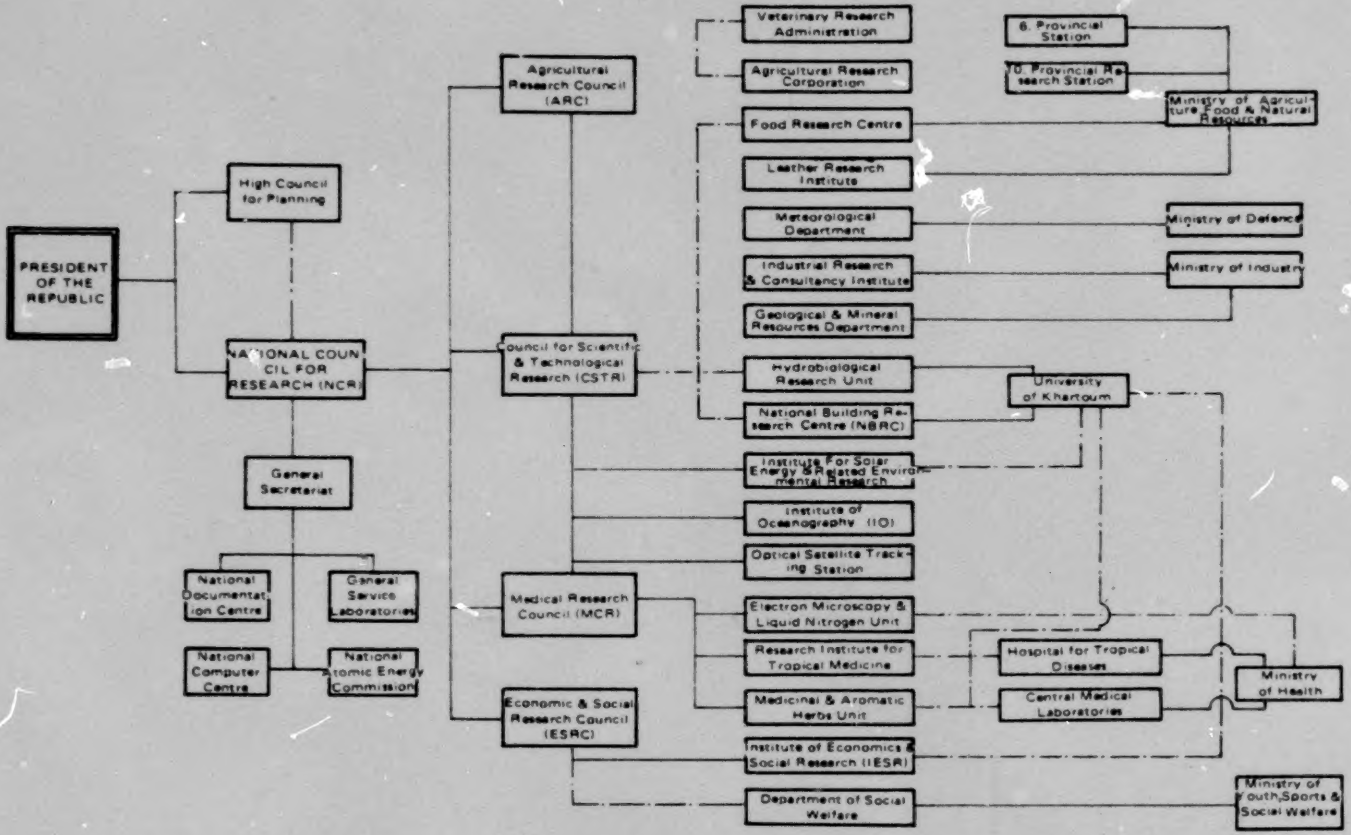
3. The modern viewpoint of scientific research is for the integration of its activities and to be geared to the welfare of development; yet scientific research bodies in the Sudan have had to suffer from the absence of a national body that would coordinate their activities and devise a comprehensive science policy for the entire country, suggesting the national norms to be employed in scientific research and in the training of personnel for development.

4. Interaction between the Sudanese scientific community and its counterparts in the Arab world, in Africa, and in the rest of the world, as well as relations with international organizations, were on a haphazard, personal basis that resulted in the inability of the country to utilise in a sound manner such international scientific cooperation.

5. The absence of one national body for scientific research affected the drawing up of a unified and clear policy with regard to the legislation concerned with scientific work, and the creation of a standardised and a rewarding salary scale for researchers, which would help to counter the instability of the scientific climate. This lack had resulted in the phenomenon of not only geographical migration, but, also professional migration of the nation's scientists and researchers.

Sudan's community of scientists and researchers, aware of these problems, continued to struggle for a solution to the discrepancies mentioned above. In 1964, the twelfth annual conference of the Sudanese Philosophical Society was held on the topic, "Scientific Research in the Sudan", and the main recommendation of this conference was for the establishment of a national council for scientific research. Such efforts, together with other sporadic efforts, culminated in the issue in 1968 of the "National Council for Scientific and Technological Research Act", published in the official gazette.

CHART OF THE ORGANIZATIONAL STRUCTURE OF THE NATIONAL SCIENCE AND TECHNOLOGY POLICY OF THE SUDAN


PRESIDENT OF THE REPUBLIC
High Council for Planning
NATIONAL COUNCIL FOR RESEARCH (NCR)
General Secretariat
National Documentation Centre
General Service Laboratories
National Computer Centre
National Atomic Energy Commission
Agricultural Research Council (ARC)
Council for Scientific & Technological Research (CSTR)
Medical Research Council (MCR)
Economic & Social Research Council (ESRC)
Veterinary Research Administration
Agricultural Research Corporation
Food Research Centre
Leather Research Institute
Meteorological Department
Industrial Research & Consultancy Institute
Geological & Mineral Resources Department
Hydrobiological Research Unit
National Building Research Centre (NBRC)
Institute For Solar Energy & Related Environmental Research
Institute of Oceanography (IO)
Optical Satellite Tracking Station
Electron Microscopy & Liquid Nitrogen Unit
Research Institute for Tropical Medicine
Medicinal & Aromatic Herbs Unit
Institute of Economics & Social Research (IESR)
Department of Social Welfare
6. Provincial Station
10. Provincial Research Station
Ministry of Agriculture Food & Natural Resources
Ministry of Defence
Ministry of Industry
University of Khartoum
Hospital for Tropical Diseases
Central Medical Laboratories
Ministry of Health
Ministry of Youth,Sports & Social Welfare

The actual organisation of the council materialised only after the May Revolution of 1969, when the head of state formed a select committee to review the entire matter. This was in March of 1970, and the various meetings specially held for this purpose resulted in the establishment, under the personal direction of the head of state, of a corporate body which began functioning in June, 1970. In October, 1971, the 'National Council for Scientific and Technological Research Act' was amended, to affiliate the Council with the Ministry of Higher Education and Scientific Research.

When, however, the Ministry of Higher Education and Scientific Research was dissolved at the end of May, 1973, the "National Council for Research Act" was further amended to create once more a corporate body. This amendment, together with all its regulations and the organisational framework,was issued in June, 1973, and a new phase in the life of the National Council for Research began, characterised by greater clarity of function, more cooperation among all authorities concerned with scientific research and development, and a practical start for the devising, executing, and following-up of the Council's scientific research programmes.

The attached chart describes the organizational set-up of the National Science and Technology Policy in the Sudan. The dotted lines mean coordination, while the solid lines describe direct affiliation.

In the previous paragraph we have attempted to analyse the justification for having a National Council for Research /NCR/ in the Sudan. The objects, functions and methods of operation of NCR are stated in its Act for 1973.

The dynamic interpretation of the objects and methods during the last five years since the establishment of NCR has contributed to the accumulation of some valuable experience; the description of which can serve the purposes of the present esteemed symposium and the feed-back would hopefully assist in more clarity and further promotion of the system.

The sources of the research plan are mainly two:

1. A thorough consultation of the official socio-economic development plan with the purpose of evolving the research inputs in that plan and thence, the determination of research priorities; and

2. Based on the declared priorities in general NCR may consider detailed submissions, preferably made by a multidisciplinary team of research workers from the University and other research bodies, for sponsorship of research projects.

The logistics of carrying out a research project are worked out in the appropriate permenant technical committees affiliated to the specialized research council, under whom the topic comes. Ad hoc committees may be called when required. The findings of the committees are passed to the specialized council who after verifying the compatibility of the project with the research priorities may recommend the sponsorship of the project by NRC.

The Central Board of NCR, which in effect is a ministerial sub-council, then makes the final decision and directs the incorporation of the project budget in NCR general budget phased out over the required current budgets.

With the limited material resources available, efforts are normally made at all functional levels of NCR to rationalize the expenses required for projects. Possible duplication and repetition of research /both on national and international level/ is the main concern of committees and councils. Hence the main constraint and sometimes a real handicap is the lack of availability of information for those concerned with making the decision.

Aware of this problem and facing it in the day-to-day activities, NCR had to proceed as a matter of urgency to give top priority to supplying the decision-makers with the information required by them prior to making their decisions.

How ongoing research is decided upon thorough information

The determination of priorities in the research plan is generally governed by a number of factors, some of which are:

1. wether the research project is relevant to the objectives and targets of the national socio-economic development plan;
2. wether the research project can be carried out by a national team with the minimal requirement of the expensive expatriate physical involvement in the project;
3. whether the requirement of the project in terms of equipment is minimal or use can be made of equipment already available somewhere in the country;
4. whether such a project with the details a priori produced is currently being tackled in any other national research body;
5. whether a similar project has already been undertaken nationally in the past;
6. whether the results of a similar project undertaken internationally are produced and proven adaptable to the local environment;
7. whether the results of the research project can be immediately applied to development, and the potential user mentioned, and in certain cases his preliminary approval to the project is guaranteed and his readiness to contributo to the expenses, in certain cases, is ensured.

These were but a few examples of the type of information required by NCR machinery to enable it to decide on the sponsorship or non-sponsorship of research projects, and to help it formulate the national research programme and, ultimately, the research plan.

It might seem like this is asking too much in conditions of a least-developing country and in conditions of the ever-mounting quantity of information. In giving below a brief description of how NCR went about the situation it might, after all, turn out, to be a managable process, because of the state of least development itself results in small or reasonable magnitudes of national inputs.

Steps taken by NCR to supply decision-makers with the required information

1. Because of the limitations in basic data about the country's resources /economic and human/ the socio-economic development plans in the Sudan used to be formulated according to projections rather than based on solid facts. The research workers, as a rule, were not in the past involved in the formulation of the plan.

   Two important achievements are worth mentioning here by way of helping future decision-makers in NCR to test the relevance of proposed research projects to development.

   Research workers representing different disciplines will contribute for the first time to the formulation of the coming /1977/78 - 1981/82/ five year socio-economic development plan. The gaps in our knowledge about the country's resources having been identified, NCR, in collaboration with a number of government and international agencies is launching a project for an economic census in the country. For this purpose, a scheme of inventories on natural resources is being drawn up and NCR is at present working out the details of the scheme.

2. To enable decision-makers to judge the availability of nationals capable of undertaking a specific research, NCR, in collaboration with UNESCO, has managed to complete the first survey of scientific and technological potential /STP/ of the country. The second STP survey is currently being finalized. Information is now available about existing experts: their distributions, qualifications, etc.

   The STP survey helped also in identifying the shortage in certain disciplines and served educational planners in their attempt to fill in the gaps.

3. An inventory of exsisting equipment worth one thousand dollars or more has been prepared by NCR. The condition of the equipment, its present state, capacity and load are registered.

4. A directory of each research unit in the country is currently being prepared by NCR, where full information about facilities, programmes and other information is given.

   Furthermore a register of current research classified by fields and sectors is being produced by NCR.

5. NCR has published bibliographies providing, as a first step, the title and the author with an authors' and a sectors' index. So far bibliographies in the following fields are available: Agriculture /flora and fauna/, bio-medicine, engineering, forestry, geology, basic sciences, anthropology, economics and sociology.

   The bibliographies attempted to put on record all that has been written about the Sudan by Sudanese and non-Sudanese in published papers, monographs, reports, etc., since the beginning of this century and up to the present time.

   The future plans are for annotated bibliographies and for actual acquisition, if possible, of copies of the literature to be made available to researchers and decision-makers. For this purpose a national documentation centre has been established and is currently being strengthened through national and international /UNIDO, UNESCO, ODA/ assistance.

6. The national documentation centre is entrusted with the purpose of supplying researchers and decision-makers with the required information available in international scientific literature.

7. A system of publications is issued by NCR including information for the ultimate user on the results of research projects. Mass media are used effectively to serve the same end.

Conclusions

Such, in brief, is the state of information as far as ongoing research is concerned. The methods of handling the information are still manual. With the growing output of research, efforts are underway to use mechanical and electronic systems. For this purpose a national computer centre is being established.

In conclusion we wish to express, from our own experience, our belief that least developed countries can manage to handle their present information requirements for decision-making in science policy and from their own experience, and making use of international cooperation, can find the information systems most suited to their own conditions. It is our purpose to caution that, because information systems as a medium of reaction depend on local environmental, cultural and psychological situations, it is neither ise nor economical to adopt prototype systems operating elsewhere. A better pproach is rather to adapt such systems and innovate local ones.

DISCUSSION, Session II, Part 2.

Moderator: J. MICHEL,
Secrétaire permanent,
Bureau national de l'information
scientifique et technique /BNIST/
France

Discussion of the paper by D. TORRIJOS

J. MICHEL: Quel est le pourcentage de couverture dans le secteur public des différents projets de recherche?

D. TORRIJOS: For the public sector we do not have very much difficulty because the National Science Development Board happens to be the co-ordinating body for science and technology. For research and development projects conducted by private universities or by the private sector and financed by the government, I think we have covered at least 80-85%.

J.E.BROWN: Miss TORRIJOS seemed to be stressing that her organization was concerned with collecting ongoing research data. Is this the primary object, or is it also devising an inventory of ongoing research? I am curious as to the weight given to these two activities.

D. TORRIJOS: Both activities are the same concern of the NSDB.

J. MICHEL: Vous avez dit que vous aviez utilisé des personnes pour mener les interviews avec les chercheurs en vue de rassembler les projets de recherche. Pouvez-vous donner un petit peu plus de précision sur le nombre de ces personnes et le temps qu'ils ont passé, etc.

D. TORRIJOS: For the first volume which was completed within three months, we had a team of twelve: eight agriculturists and four with a background in statistics. We employed more for the second volume which covered areas on pure and applied sciences, excluding agriculture. This volume was completed within a period of four months.

M. EL HADI: I am interested in knowing the time lag in the preparation of the volumes. The one about agriculture took three months for compilation, but how much time was necessary for printing? and what would be the next step after that? I am afraid that by the time the information appears, it will have become retrospective.

D. TORRIJOS: For the first volume, because we had a serious deadline for the ASCA meeting, it took us three months to gather the 1969-1972 data and printing. we had people working on it overtime but of course, the coverage of the volume was not so complete, around 70%, that is why we had to put up a supplement within one year's time.

Discussion of the paper by A.Y. EL SAMMANI

M. TEJEDA: You have said that, when considering a project, you make sure that no similar project has been undertaken at national level. I would like to ask you what means you had to check whether this project had been undertaken in another country?

Y. EL SAMMANI: The only way of checking this, of course, is to build up documentation and you can imagine how difficult this is. But fortunately enough, applied research or research and development are environmental research that will concern an environmental zone, for example, the problem of a disease like onchocerciasis, we are in the belt where this disease exists, it is a national problem for us, but it is also a regional problem, so it is easy to find information from the belt. However, when we go for elementary particle physics or something like that, here, of course, the problem becomes complicated for us. So, the only thing that we are doing at present, is entrusting our young documentation centres together with foreign centers and international institutions, to supply the relevant information.

M. EL HADI: Thank you Dr. SAMMANI for your excellent presentation of information requirements and achievements in Sudan. In connection with the inventories you mentioned, I would like to call your attention to the fact that I had the privilege of working in Sudan in 1972 as a UNIDO consultant, and I found then one of the most fascinating systems of research in progress installed in Sudan in the late 1960's. In this system, all ongoing agriculture research projects were combined together in a system connecting the agricultural experimental stations. A list of descriptors was developed and the information was entered on edge notched cards. I hear that you again did an inventory which seems to me to be already in existence. I feel here a certain tendency common to developing countries, that is, when you establish new mechanisms you stop the old ones even when they are successful, instead of coordinating them.

Y. EL SAMMANI: Your information was correct three years ago,but it is no longer so.In fact,we updated the inventory you mentioned and added to it new sections excluded then from agriculture like for example, soil. On the other hand, I mentioned at the beginning that we are still in the process of finding the ways and means. But, I would like to assure you that our system, so far, is working on centralization as far as the activities are concerned, but leaving all freedom as far as the actual research work to be done.

H. ARNTZ: You have outlined basic conditions for assigning priorities. The same conditions exist in your neighbour countries, Egypt on the one side and the countries of the East African community on the other, so for reasons of economizing, have you established regular exchanges with your neighbours?

Y. EL SAMMANI: You are possibly aware that we started that, by having the FID meeting for East African countries in Khartoum recently and together with the Scientific Council of Africa, which convened its fifth meeting in Khartoum, we are now designing a policy of co-operation,not only in the East African region but within the framework of the Scientific Council of Africa.

D. SENE: J'aimerais poser au Dr. EL SAMMANI deux petites questions. La première a trait à votre projet de participation des scientifiques à l'élaboration du plan. Sous quelle forme cette participation aura-t-elle lieu? Est-ce sous forme d'informations que les chercheurs donneront aux développeurs en vue d'initier des projets de développement? Est-ce sous forme de recherches à entreprendre pour permettre aux projets de développement de se réaliser? La deuxieme question porte sur le besoin d'avoir un système propre, soit a une région soit à un pays. Or la tendance universaliste à laquelle nous assistons et que j'approuve entièrement, consiste à avoir des systèmes universels, uniformisés afin de faciliter la communication de l'information.

Y.EL SAMMANI: In as far as the participation in the formulation of the targets of the socio-economic plan is concerned, it was decided now that five technical committees will be established. Researchers would sit in these committees and supply the information needed. When new targets require certain research to be done, they will know the capability of their research units to undertake it. This system is very realistic since it will help us to formulate a very realistic research plan. On the other hand, for the first time, a separate chapter in the plan will be devoted to research and development. But there are some disadvantages. First, scientists tend to be prisoners of their fields rather than to extend to other fields and for that the sense of teamwork is still to be developed by us. Second, scientists might think that if the plan fails the blame would be theirs and for that they will be a little restrained and less effective.

Concerning your second question, I said that I would like at this stage to marry the national and the universal approaches. As far as stadnardization of terminology and mechanical methods are concerned, I would go for a universal system. Certain details, however, should be left to the national agencies. For example, questionnaires do not work in our country, for several environmental reasons like: illiteracy is 80%, scientists have no time to fill in the questionnaires and send them. If we take the team method, we again have a problem because the approach of the team is not uniform.

Discussion of the paper by D. LAKAMP

I. WESLEY-TANASKOVIC: May I ask you three questions. First, owing to the rather ephemeral nature of information on ongoing research, how old is the operational file that you are using in the exchange for the retrieval of information on ongoing research? Second, is the input in your system restricted to the ongoing research in the USA? Third, what is the ratio between the users of your system from inside the USA and from abroad?

D. LAKAMP: With regard to the age of the data in the data base, we maintain an active file which averages approximately two government fiscal years. As we get into a third U.S. Government fiscal year, we will delete from our active file and move to a historical file, information on projects which are no longer being updated by our inputting organization. This historical file is still searchable but is difficult to retrieve, primarily because it is stored on microfilms and reproduction of the microfilm to hard-copy is an expensive and time-consuming process. In reply to your second question, traditionally, we have registered input from any source that chose to give it to us. For example, the International Atomic Energy Agency has been registering research with the SSIE for several years. Recently we have begun to actively solicit input in some selected areas where there was high international interest and concern such as energy and cancer. Dr. FOSTER of the SSIE will be speaking on the subject of the ICRDB data base in cancer later on. In answer to the third question, I say, approximately 10% of the questions that we respond to, come from outside the USA.

E. DE GROLIER: Vous avez mentionné que vous aviez un système d'indexation aidé par machine - "machine-assisted" - pourriez-vous donner quelques détails sur la réaction "man-machine"?

D. LAKAMP: This subject is a little out of my area, but for details on how our machine-assisted indexing system works, I would refer you to the following recently published article by HUNT, B.L., SYNDERMAN, M., and PAYNE, W. Machine-assisted indexing of scientific research studies, in Journal of the American Society for Information Science, 26, No.4. 230-236 p. /1975/.

M. EL HADI: May I ask, how many of the 10% of the inquiries are coming from the developing countries?

D. LAKAMP: There are very few, because of the cost barrier. We are attempting to take some steps through some of the international organizations having offices in the USA, to try to figure out some way around that problem, but we have not solved it yet.

P. CHETTLE: Can you please tell me what proportion of your 125 000 projects on file originate from industry and also what proportion of your requests for information come from U.S. industry?

D. LAKAMP: I am not certain of the figures, and I shall have to guess slightly, but I think that probably less than 10% of our file is industrial research and in terms of requests for SSIE research projects, about 50% come from industry.

E. SAMAHA: In connection with the use of your system, I think that, in the USA, users might like your procedure: the user sends an inquiry and then the information is retrieved for him with the computer. In the developing countries, they would like to have this information more accessible and locally available to them in the form of publication for example. That is why, probably, you do not have too many inquiries from these countries. Have you considered ways of printing the information to have it spread worldwide?

D. LAKAMP: There are two answers to that question. Yes, we have considered ways to try to reduce the information on file to printed form, and there are two very serious problems with that. One is that the volume of information in our file in any printed form other than microfiche or microfilm is so high that it is unrealistic to think of trying to print it in its totality. We did attempt to try to print a series of volumes with titles only, at a time when the size of the file was approximately 100 000 projects, and it came out in a series of 12 volumes which is too much. We also attempted to put the information on microfiche, but there was not enough interest in that particular product to warrant our continued attempts to do it. I think part of the reason is that, by the time the information gets from our system into some kind of publishable form, an awful long period of time has elapsed since the input document was originally filled out. The value of the data base at any fixed point in time tends to deteriorate very rapidly. We are at the moment actively exploring ways in which we might be able to deliver information in the developing countries from our system and overcome the existing barriers of cost. We have not gotten far enough, that we can say with any certainty that we will reach that goal, but it is an objective of ours.

D. HERSEY: I might just add one thing to what was said because I think, maybe, you were thinking of something just a little different. We do produce a series of publications in special areas of research on a regular basis: information on marine sciences, information on water resources research and various other subject categories which are prepared at the request of organizations in our own government. These are printed and distributed at relatively inexpensive prices: $ 8,50, $ 10,50, the prices, of course, keep rising every year, but these are apparently successful means of disseminating information in selective subject areas at a very modest cost and it is probably more along these kind of lines that you were thinking, I suspect.

H. ARNTZ: How do you become aware of discontinued projects? The reason for that is, if you want to base your decision about avoiding duplication on something, your projects must be alive and you must be certain of that.

D. LAKAMP: Through our system, with the exception of a very expensive historical search of our files, you cannot do that. You can always turn to the literature and the abstracting services to find what the results of the research were, but if there is a value to our historical file and probably this is the primary reason we continue to maintain it at some cost, it is because there are a lot of research projects that never end in a publication and so we do retain the information in the event that it needs to be searched.

D. HERSEY: Dr. ARNTZ, did I understand your question: How do we determine that a project has been terminated and thus make sure that the data that is in the bank is up-to-date and current? The answer is, by getting new submissions every year on each project. In other words, every year, if a project is continuing, a new résumé will come in to replace the old one, and so we are assured that if a new résumé does not come in to follow up, that means that the project has probably been terminated.

V. VINCENT: Je voudrais savoir si l'information vient uniquement des organisations de financement ou aussi des organisations qui font la recherche et dans ce cas, comment fait-on pour éviter un double enregistrement?

D. LAKAMP: That is a good question, because it is a problem. We attempt to collect the information either from or through the supporting organizations. They often collect it for us from the investigators.To avoid the problem of duplication, we resist going to the research organizations themselves except in some very special areas where there is high interest and where we want to expand the comprehensiveness of the coverage as much as possible.

PANEL DISCUSSION

PROBLEMS AND METHODS IN THE COLLECTION AND PROCESSING OF ONGOING RESEARCH INFORMATION

DISCUSSION DE GROUPE

LA COLLECTE ET TRAITEMENT DES INFORMATIONS SUR LES PROJETS DE RECHERCHE EN COURS: PROBLEMES ET METHODES

Moderator: J.E. BROWN,
Director,
Canada Institute for Scientific
and Technical Information /CISTI/,
National Research Council

Members: J.M. DUCHOT
R. SAUTEREY
W.R. FOSTER
H. HEINRICH
D.E. TORRIJOS
J.R. MYERS

J.E. BROWN: We have a Panel of experts who have been actively engaged in organizing and developing data bases of ongoing research.The discussion is to deal with problems and methods in the collection and processing of ongoing research information. As I listened to the papers that have been given today, a great many problems and methods have surfaced, in the papers presented and some of the questions that have been asked, so I think this gives us a jumping-off point for this discussion. I would like to remind you that this is not intended to be just a discussion between the people up here at this table. I am hoping that between us we can spark some interest, some questions and some comments from the audience. I jotted down three or four problems:

1. The concern with the timeliness of the data that is being stored.
2. The collection of data from industrial firms.
3. The purpose of the inventory of ongoing research, i.e. what are the priorities to collect fiscal data, to have a knowledge of research projects that are going on, to avoid duplication of effort?
4. The costs of the operation, costs of expertise to carry out the indexing. Those are some of the problems that I detected. Mr. FOSTER! Could I get you to comment on your experience in collecting information from industry. What are the problems?

W. FOSTER: We find that industry in general will not participate in a system which could violate their sense of proprietary rights and this is understandable. However, in certain circumstances, we do find that the industrial input is possible and at SSIE, we have received several thousand projects that represent work going on in industry. One of these conditions is clear when the support for industrial work comes from government funds or some external source which request or require registration of the research information, so that this tends to work fairly well. Another condition is when there is something to be gained, in the way of saving money by industry in participating and there are certain situations in which this works very well. One of these will be presented later in relation to the International Cancer Research Data Bank Programme in which it will be mentioned that participants in the programme will receive all of the publications which come from the programme and each investigator will have volumes which collect together all the work that is like his own work, so in this case the individual investigators in industry are receiving benefit from participation. Another example is one that has to be focused very clearly and strongly in the near future, and that is chemical compounds undergoing testing for possible toxicity. There is considerable interest in the USA on the part of both industry and government in having a central repository of compounds undergoing testing to avoid unnecessary duplication of effort. It's very expensive to test one of these compounds, perhaps $ 100 000 per compound, and if you can save the cost of testing even one compound by knowing that someone else is testing it, this becomes a very profitable venture, so that industry is interested in participating on that basis. So, there are these circumstances under which we have found that industry participation will take place. On the other hand, I would not want to imply that our general experience has been one of tremendous success because for a typical case, we run into the industrial legal counsel who is very hesitant about revealing what is going on inside the industrial research laboratories, because this may decrease the ability to patent information or products later on, so that it becomes a very difficult problem to deal with.

H. HEINRICH: In the Federal Republic of Germany we publish today all projects funded by the Ministry of Research and Technology. Only the title of the project is published without any description and I know, that, in some cases, industrial firms have not sent us a request for funding because they knew that the title of the project would be published.

C.R. CAVALCANTI: I would like to ask Mr. FOSTER, if there is any way in your system at the Smithsonian Institute by which you could prevent confidential information from being known to other persons.

W. FOSTER: In general, we only handle information which is public in nature and there is no arrangement for condifential and secret information of any kind. It is possible for an inputting organization to specify limited distribution in some cases, and we are willing to work out arrangements like this, but in general the data basis is public.

C.R. CAVALCANTI: In this way, don't you think that information is limited because it excludes confidential or more or less confidential information?

W. FOSTER: Yes, limited in one sense; and clearly those government agencies, which require confidential and secret information, are not able to have that information available through this channel. On the other hand, the primary purpose of the organization is to disseminate information as widely as possible, especially to scientists who need it for their own work and to administrators who deal with the management of research information. These purposes are best served by the general availability of the information.

R. SAUTEREY: Un problème analogue s'est posé dans l'organisation internationale appelée "Documentation Internationale de Recherche Routière". Après examen de la question, la condition formelle retenue pour qu'un projet de recherche soit enregistré est que les résultats de cette recherche puissent être disponibles au public. Ce qui exclut automatiquement de nombreuses recherches effectuées dans le secteur privé. Cela semblait préférable, car respecter les clauses de confidentialité apparaît honnêtement extrêment difficile. D'autre part, la justification d'un système d'information sur les recherches en cours est quand même de pouvoir avoir, à un moment donné, les résultats disponibles. Si bien qu'une recherche, dont on sait à priori que les résultats ne seront jamais divulgués, perd beaucoup d'intérêt à être connue.

J.M. DUCLOT: J'irais même plus loin dans ce que vient de dire M. SAUTEREY. Je pense que même dans la recherche publique, lorsqu'elle est subventionnée par l'état et lorsque cet état pense avoir une certaine avance dans un domaine particulier, il a tendance à faire une rétention d'information pour garder son avance. C'est tout à fait humain. Bien que les documentalistes et les scientifiques souhaitent tout connaître, on est obligé de constater que

cette rétention existe et on peut se demander si, dans l'avenir, ce phénomène de rétention de l'information tant dans le domaine privé que dans le secteur public ne viendra compliquer énormément la réalisation de ce que nous voulons faire aujourd'hui, une banque d'information quasi-mondiale.

D.E. TORRIJOS: I just have one comment in connection with the confidentiality of data.If our purpose in establishing an information system is to disseminate information, then what is the point in collecting information which, from the very start you know you will not disseminate because of its confidentiality. However, if the purpose is to collect information for national organizations which have the responsibility of coordinating or planning R & D programmes, I think that such data are useful because then you do not finance, especially if your resources are limited, any more projects that are being undertaken elsewhere whether in the private or in the government sector.

P. COQUAND: La Conférence Européenne des Ministres des Transports soutient, depuis maintenant sept ans, une activité dans le domaine de l'échange d'informations sur les projets de recherche en cours qui relèvent du domaine des sciences économiques et politiques du transport. Cette activité considérée de première importance a été demandée directement par les décideurs et les planificateurs en matière de transport. C'est dire que nous avons la chance d'atteindre un domaine d'utilisateurs très spécialisés, qu'à ce niveau là, même les recherches qui ont un charactère confidentiel ont une grande importance au niveau de l'information mutuelle qu'on peut donner aux différents ministères du transport, c'est-à-dire que, même lorsqu'une information ne sera pas complètement accessible après sa publication, il y a toujours des degrés dans la limitation, elle n'est pas forcément complètement confidentielle, et tant au niveau des gouvernements qu'au niveau des chercheurs individuels nous nous sommes aperçus que les chercheurs entre eux avaient souvent la possibilité de négocier d'égal à égal une partie de la méthodologie ou des résultats statistiques d'enquête, et même si nous indiquions dans nos diffusions et dans nos publications que le projet était restreint et donc ne serait pas mis à la disposition du public, un voeu unanime s'est fait sentir pour que nous informions, malgré tout, l'ensemble de la communauté des chercheurs sur des projets prétendu confidentiels.

L. HENNICO: Concernant les données confidentielles, en Belgique on essaye de recueillir, comme probablement d'autres pays, auprès des firmes d'une certaine importance, des renseignements sur leurs recherches. Pour cela on garantit la confidentialité des données si le fournisseur le désire. Malgré cela, une grande partie ne répond pas au questionnaire, et quand ils répondent,et c'est normal, ils donnent, en général, des résultats abrégés sur les questions de volume du personnel et de fonds mis en oeuvre. Ils sont beaucoup plus réticents pour la description des projets qui sont tout au plus très vaguement indiqués. Ces renseignements ne sont pas pour autant inutiles. En effet, du point de vue national il peut même être intéressant de savoir que la collectivité /firmes privées ou centres nationaux/ agit dans tel ou tel domaine même si c'est très vaguement indiqué. Pour ce qui est des recherches publiques dont on ne désire pas rendre les résultats publics, immédiatement du moins, mais peut-être dans un certain avenir, je crois que là aussi la collecte est quand même fort intéressante, parce qu'une collecte comporte notamment le nom des chercheurs qu'on pourrait qualifier de "peut être experts" et je crois que cela peut être intéressant même si on ne sait exactement quels projets de recherche ces gens conduisent.

A. NEELAMEGHAN: This is not exactly related to confidentiality but, however, supposing a company undertaking a piece of research would ask, let's say, the Smithsonian Institution, who are all the people who have asked a certain type of question to SSIE during a certain period of time, would they provide such a piece of information?

W. FOSTER: This is not one of the services that we usually provide. It can be done in general terms without violating the confidentiality of the questioner. Now, it is debatable whether the questioners require confidentiality, but this is a tradition that we usually observe, that the questions that one

source asks are not necessarily public information, whereas the documents we maintain are public information, so that in general we do not make up lists of the questions that other people ask. We do summarize in statistical ways the user population of the system, but ordinarily without identifying the particular users.

Mme GUIGAN: Ma question a trait à la confidentialité. Je pense qu'il est intéressant de pouvoir collecter des projets confidentiels pour pouvoir répondre à une question dont la réponse ne doit pas être absolument spécifique. Par exemple, y a-t-il des projets sur un sujet donné? et qu'on puisse affirmer qu'il y en a ou qu'il n'y en a pas! Ainsi on ne dévoile pas un secret en donnant cette réponse qui peut etre décisive pour des orientations de recherche.

J.E. BROWN: This is a very good point.

J.M. DUCROT: Je suis tout à fait de votre avis,Madame, mais ceci supposerait que le secteur privé donne ces informations.Il est absolument impossible dans l'état actuel des choses d'être sûr d'avoir une réponse lorsqu'on se pose la question: est-ce que ce sujet est entrepris sur le plan national par quelqu'un ou par n'importe quel organisme public ou privé? Public, oui, on le sait, et encore, je vous ai dit quelque chose tout a l'heure mais sur le plan du secteur privé, non. Au contraire, le secteur privé est à l'affut des idées des autres pour savoir ce qu'il doit faire pour avoir quelque chose d'original. Je crois que c'est un voeu pieux, on le souhaiterait, mais partiquement dans l'état actuel des choses, je le crois pratiquement irréalisable.

Mme GUIGAN: Il y a un autre aspect qui pourrait encourager le secteur privé à signaler les projets qu'il veut garder confidentiels et dont on limiterait la communication à certaines autorités. En effet, en prenant connaissance de ces projets, ces autorités ne financeraient pas de projets concurrents.

J.M. DUCROT: J'irais même plus loin, Madame. Certains projets de recherche menés par des organismes privés reçoivent des subventions gouvernementales et très souvent, lorsqu'on s'intéresse à un de ces projets de recherche et quand on arrive à avoir communication, non pas du résultat mais tout au moins du sujet exact, on se rend compte que le sujet annoncé pour obtenir une subvention est souvent différent de l'objet réel de la recherche, toujours par souci de confidentialité.

E. SAMAHA: I think that we should not be too much concerned with this problem of communication of industrial reseach information in a CRI system, because researchers in industry are one-way users of such information. Let us look at this problem in a different way. CRI system is not intented to communicate results of research, but only to show the areas of interest and to identify the expertise in the various disciplines. This should help in getting wider contributions and I would not be as pessimistic as Mr. DUCROT concerning its success. One could communicate an area of interest without being too specific about the project itself keeping, thus, the confidentiality. Such information is useful since it would tell who is working in a particular ares enabling the one who is looking for this information to communicate with him or them. The parties concerned would see then how far they can go with this communication. The industrial sector might then be interested because the exchange of such information with university researchers, for example, is certainly helpful for both.

J.E. BROWN: In Canada, when we started this inventory, we got bogged down in this discussion of confidentiality. However, since we were not yet collecting from industry, we decided to put that aside and face it when we come to it.

J. MYERS: I would like to agree with the last speaker quite extensively, I think he covered it very well, but I would like to comment on this confidentiality problem. In the Department of Agriculture in the United States, we have decided that nothing is to be considered as confidential. A "Freedom of Information Act" recently passed by the United States Congress covers material like this and states that any information collected by government agencies is public information. Now, as one of the respondents mentioned earlier, there is a level of documentation that is involved here. Information can be very helpful without necessarily being confidential. One of the problems our researchers mention is that they do not want to be "scooped" in a project. They are not going to document something to the extent that someone else will know exactly what they are doing. We feel that they can document it to a certain degree that will provide information that other researchers need and can use, and can use to contact them if they are interested in that particular area. In the area of private research, we have found that the private industries are very interested in getting information from us, although, to keep the record straight, we do not provide information to any private concern, we forward those requests to the Smithsonian. But there is an organization in the U.S. called the Agriculture Research Institute comprised mainly of private research organizations with some input from the university professors, and so on. This year, the President of the Institute is an Associate Director of an agriculture experiment station at the University of Missouri. He is very knowledgeable about our particular research information system in agriculture and he is very interested in getting some input from industry so that we can coordinate it with the University and USDA input we now have. But it is going to take the form, it seems, of a global summary more than a description of individual projects. Out of this summary we can get some ideas on what is being done but we won't know researchers' names on a project to project basis, and I think this holds some benefit for the future.

J.E. BROWN: We don't want to belabor this point. We all recognise that there are problems in collecting this information from the private sector. However, there are also problems in collecting the data from government agencies, even though the research projects may be government funded. There is often reluctance on the part of federal government agencies to give the data unless they are really forced to in some way or another. Would any member of the panel like to comment on that?

J. MYERS: I respond to that. The research in our system covers all agricultural research funded or sponsored by the U.S. Department of Agriculture. By directive, in effect, all this research must be documented and input into the system. Now, this is a form of arm-twisting since, within the various agencies that report to the Department of Agriculture, they really have no choice. But there is a feeling of cooperation among the groups, so we don't feel that we have any problem. Now, in addition, much of the research we have in this system is conducted at university agriculture experiment stations. Some of it is funded by the U.S. Department of Agriculture, but much of it is not. When we first started this system in 1967-68, we found a reluctance on the part of the universities to report this non-USDA funded research. Over the years we have found that this is being overcome, primarily due to benefits derived by the universities through interaction with our research system. The Department of Agriculture has always been in the fore-front of the cooperation with the state and private industry groups regarding research, so right now one third of the data in our system is contributed on a voluntary basis by these universities. Now, we have no arm-twisting on these particular projects, around 6000-8000, not receiving USDA money. So it is a matter of providing enough benefit to the community to encourage them to contribute to the system.

W. FOSTER: I might comment briefly to reinforce what Mr.MYERS was saying with respect to the federal support of research in the USA. We have the additional advantage, which may not be true in some other countries, that some federal agencies do require the completion of a project description form as part of the procedure for obtaining support from the federal government and where this is done, it works very well. In some of these cases, it is not so much a requirement that is written into the rule-book or the law, as it is a procedural matter and in these cases it seems to work equally well, i.e. the investigator must complete a form as part of his application for research support. This form is detached and sent to the USDA as a routine procedure, so this gives us rather complete coverage wherever this mechanism is used.

P. CHETTLE: In the work I am doing, I have discovered that in English universities, almost half of the senior research workers, usually departmental heads I have talked to, are very willing to give some kinds of information but for some other kinds, like details of research funding, they would not like to contribute to a system which is going to receive wide publication. I wondered whether SSIE finds the same reluctance on the part of American universities to fill in all the items on their project data sheet?

W. FOSTER: Most of the funding information which we receive comes from the supporting agency and in this case we have the dollar level of support for each project. I think 80% of our file has reporting from the funding organization rather than from the individual institution that is performing the work. It is a voluntary matter in the case of these institutions that are reporting directly as to whether they are willing to provide this information or not, and we find many who do not mind and as many who do mind, so it is hard to make a generalization.

J.E. BROWN: May I comment on that. In Canada one of the requirements for a university project to get government funding, is that the applicant must return the form describing the project. The actual cost of the project appears in the form.

R. SAUTEREY: Je crois qu'il est exact qu'en général, il y a toujours une certaine réticence à fournir les éléments financiers et je crois qu'également, quand ces renseignments sont fournis on est toujours amené à les regarder d'un air un peu dubitatif, non seulement du point de vue de leur sincérité, mais aussi de la définition réelle de ce qu'on appelle le coût d'une recherche entre les differents organismes: savoir si les frais du personnel sont inclus ou non, si l'amortissement des installations est inclus ou non, si les frais du fonctionnement sont inclus ou non. En général, je crois qu'on est amené à considérer l'indication du coût qui figure dans les fiches concernant les recherches en cours plutôt comme un ordre de grandeur.

J.E. BROWN: What really raised this question was: what is the reason for those inventories? what are the priorities? is the first purpose to get fiscal data on how much the government is spending on research? or is it, as I mentioned earlier, an attempt to know what is going on in the field of research to avoid duplication and to assist in the communication of this information?

L. HENNICO: Je vais, peut-être, recouvrir partiellement ce que les deux orateurs précédents on soulevé. En Belgique, la collecte des informations sur les recherches en cours se fait actuellement volontairement et je crois que c'est une erreur car il y aurait moyen de la faire directement auprès des unités de recherche. Là se pose, en dehors du problème de la confidentialité éventuelle dont on a déjà parlé, le problème bien humain de la paresse de répondre à un questionnaire. Je dois dire qu'il y a aussi, parfois, de la part de certaines personnes astucieuses qui recourent simultanément à plusieurs sources de financement, une volonté de dissimulation tout à fait compréhensible. Une telle attitude existe à différents niveaux. En effet, il a été constaté récemment dans une université belge d'une certaine envergure que les autorités académiques n'avaient aucune idée du nombre des projets de recherche couramment exécutés dans leur propre université. Pour expliquer ceci, je dois préciser qu'une université fait des recherches subventionnées directement par le gouvernement dans le cadre du programme national ou avec des fonds nationaux et des recherches finencées par l'université elle-même. Pour ces deux sources, il n'y a aucune difficulté à obtenir des précisions sur le coût des projets. Mais il y a aussi une troisième source, à savoir les contrats plus ou moins officiels passés entre les firmes privées et les autorités académiques. Là, et c'est humain, il y a une petite tricherie: les frais de fonctionnement sont imputés à l'université tandis que les bénéfices rentrent dans des caisses plus ou moins officielles. Un tel phénomène est difficile à contourner sauf si les universités veulent bien contribuer à cela.

D'autre part, cette question de coût me semble assez douteuse. Je suis un peu convaincu que lorsqu'on parle de coût on ne sait pas exactement de quoi il s'agit. Voyons d'abord, pourquoi veut-on collecter des précisions sur le coût. Si c'est pour faire une comparaison avec d'autres pays, je crois qu'une telle comparaison est fondamentalement vicieuse, car elle suppose que, dans tous les pays, on finance la recherche de la même manière. Admettons la comparaison, celle-ci ne peut s'appliquer qu'à deux choses plus ou moins semblables, or la notion du coût n'est jamais bien définie: s'agit-il d'un coût moyen, d'un coût marginal? comprend-il le coût des terrains? les frais de fonctionnement? Donc cette comparaison ne sert pas à grande chose. Tout au plus pour certaines sections de gouvernement, il serait seulement utile de relever les coûts marginaux, c'est à dire l'institution ou l'université étant ce qu'elle est, ce que coûte en plus la recherche pour être exécutée, en argent, en effectifs et en équipements.

S. SCHWARZ: I have a question to the panel which may imply a kind of moderation on the optimistic statements of the usefulness of disseminating non-specific information which is the case for part of what we are talking about. There seems to be a kind of logical similarity between information on ongoing research and what has been called in the literature "half-baked ideas", for instance by I.J. GOOD. Now, I would like to ask you your experience concerning the noise in the information system which is generated by disseminating these kinds of half-baked ideas which are the contents of statements of ongoing research. For example: somebody gets a reply that something is ongoing - how would he know that this ongoing research would really be successful and how can he judge that redundancy is really unnecessary? Redundancy is sometimes necessary.

J.E. BROWN: I would assume that since a piece of research is being funded in some way or another, it must be judged by the researchers' peers. Presumably, therefore, that is some way of determining that the research is of some value.

H. HEINRICH: I think that this is related to the purpose of the inventory. If you want only to promote the discussion between project leaders, it doesn't matter whether the project will come to a good end or not. But, if you produce an inventory of research sponsored by a ministry, you must give financial data because the money is given by the parliament and you should tell what you have done and give an idea of the importance of the projects. I think that the purpose of such an inventory is to inform, on one hand, the scientific community and, on the other hand, to give parliament and the public an idea on what is being done with the money allowed for research.

E. SAMAHA: About the financial data, I think that, on an international level, they would not be useful at all, because of the differences in the cost of living and the cost of material in the various countries making any comparison meaningless. On a national level, this may not interest the scientists too much - but it rather interests the research planners and in that case each country could find the best way to collect that information and to diffuse it or keep it confidential.

J.E. BROWN: We have found in Canada that scientists are very interested in this information. We find that when the printed volumes come out, one of the things the scientists do, is to take a look to see whether Prof. SMITH in Vancouver is getting more than Prof. JONES in Montreal for somewhat the same project. Your other comment? Are you suggesting that the financial data, while it is of value to the policy-makers, is really of use only nationally, i.e. that you can't compare it internationally?

E. SAMAHA: I am talking from the developing countries' point of view. When I see the differences in the cost of living and in the cost of material, I doubt that one could make use of the financial data. Secondly, in the developing countries it is difficult sometimes to figure out the cost of a project, especially when the project is carried on the department budget of a university. Sometimes also one can use the facilities of the university to produce some of the equipment and in that case the cost would be very little compared to the cost if one buys this material. In such cases you may get lost if you try to compare the cost of two similar projects.

J.E. BROWN: That is certainly a very interesting comment. Is there anybody else in the audience who would like to make a comment.

D. SENE: Monsieur le Président, vous vous êtes interrogés à un certain moment sur la finalité de ces inventaires sur le potentiel scientifique et technique de façon assez large. En ce qui concerne les pays en voie de développement, et notament ceux d'Afrique, il faut considérer d'abord que la recherche est à l'instant très embryonnaire dans la plupart de ces pays, qu'ensuite la plupart des subventions destinées à la recherche sont fournies par le secteur public. Il est intéressant pour tout pouvoir public de savoir exactement, de la façon la plus précise possible, quel est le montant de ces dépenses publiques destinées à la recherche comparativement à d'autres secteurs; il est également bon de pouvoir comparer les différentes dépenses de recherche entre les disciplines. Cependant, ne nous limitons pas uniquement à la questions des moyens financiers, il y a également celle, non moins importante, de l'effectif des chercheurs qui opèrent dans un domaine déterminé. En plus, étant donné les moyens financiers limités et les effectifs humains insuffisants, en tout cas dans nos pays, il y a lieu de conjuger les efforts,de se répartir les tâches pour éviter les doubles emplois; donc de mieux organiser une sorte de coopération, non seulement régionale, mais également internationale. Il est intéressant de pouvoir comparer au niveau des différents pays les efforts déployés dans les divers secteurs, et les thèmes des recherches entreprises, afin de pouvoir organiser cette coopération et d'harmoniser les programmes dans différents pays. Je pense qu'il est relativement aisé de démontrer pour nos pays en voie de développement et notamment ceux d'Afrique, l'utilité et même la nécessité de procéder à ces inventaires et d'assurer une meilleure information sur les recherches en cours.

J.E. BROWN: Thank you. I am going to use the moderator's prerogative and move on. One topic that did come up two or three times, was the time limits of the data, and this raises the question: how useful is it to have this information come out once a year or more often? Should it be necessary to have it on-line so that you can have access to this information at any given moment in time? Are there any members of the panel that would like to comment on those points?

R. SAUTEREY: Je crois qu'effectivement l'information sur les recherches en cours est par définition une marchandise qui se déprécie. Mais il ne faut pas quand même être trop pessimiste ou trop optimiste sur la recherche. Un projet de recherche ne s'accomplit pas en une année, la plupart des projets s'étalent en fait sur deux, trois années et même plus. En matière de recherche routière dans la DIRR on a retenu le principe de faire une enquête complète dans chaque pays tous les trois ans, considérant que trois ans était à peu près le délai normal d'accomplissement d'une recherche dans ce secteur. Chaque année par contre, on fait une mise à jour ayant essentiellement pour but de signaler les nouveaux projets et d'indiquer également les projets terminés. Je crois qu'ainsi on réussit à conserver à la marchandise stockée une valeur d'actualité convenable. Je dois vous dire qu'en ce qui concerne les recherches terminées, elles ne sont pas éliminées de la mémoire, car je crois qu'il est important de pouvoir savoir à un moment donné si des projets de recherche ont déjà été accomplis, qu'ils aient donné lieu à un rapport productif ou qu'ils se soient soldés par un échec. Je crois que pour les décideurs en matière de recherche, savoir qu'une recherche a déjà été effectuée quelques années auparavant et qu'elle a été arrêtée, est un élément non négligeable.

P. COQUAND: Je voudrais rapporter ici le fruit d'une autre expérience. A la Conférence européenne des Ministres des Transports nous avons étudié cette question de la fraicheur et du renouvellement permanent de l'information,car nous nous sommes rapidement aperçus que les chercheurs avaient un véritable besoin de savoir, au moins une fois par an, quels étaient les travaux en cours ou les travaux nouvellement entrepris. La solution retenue consistait en une double publication de l'information sur les recherches en cours: une publication qui paraît à la fin du premier semestre de chaque année, fondée sur une enquête annuelle faisant apparaître les nouveaux projets de recherche mis à l'étude dans l'ensemble des instituts et auprès des gouvernements qui traitent de ces recherches de politique et d'économie des transports; et une fois par an, au moyen d'une nouvelle enquête où chaque participant à l'information reçoit l'ensemble des bordereaux d'information qu'il avait déjà fournis à la CEMT nous remettons à jour l'ensemble de tous les projets qui sont encore vivants dans la mémoire de données. Cela fait d'ailleurs un nombre limité de projets par an qui ne dépasse pas un millier environ pour les pays européens, y compris une sélection des États-Unis /car nous sommes très sélectifs pour ce pays/, qui sont signalés aux chercheurs dans un ouvrage où ils sont classés par mode de transport, ce qui paraît le plus pratique pour ce domaine. Les chercheurs ont ainsi, associés aux données renouvelées, une liste des instituts qui ont repris les recherches ou qui les poursuivent, avec les noms des chercheurs. Nous nous apercevons qu'il n'est pas inutile de remettre ces données complètement à jour une fois par an car un grand nombre de bureaux de consultants et d'ingénieurs, voient le jour et disparaissent dans des temps record; en outre, comme cela a déjà été souligné, les recherches en cours ont des vies souvent en dents de scie, très mobiles, et il est bon d'éliminer régulièrement de la mémoire ou de mettre à part tout projet qui paraît plus ou moins abandonné. De ce fait, les utilisateurs qui reçoivent l'information publiée par la CEMT sont absolument rassurés qu'une vérification, projet par projet, a été effectuée et que l'information qu'ils reçoivent est parfaitement fiable, et il me semble que ceci est assez apprécié dans la communauté scientifique intéressée.

J.M.DUCROT: Je crois que vous avez tout à fait raison et je rejoins M.HEINRICH sur la forme imprimée des projets de recherche en cours, mais il faut bien dire que nous sommes au debut de cette opération de stockage de tous les projets de recherche en cours. Un exemple nous a été donné tout à l'heure par notre Président qui nous citait qu'au Smithsonian Institute la publication de tous les projets en cours représentait un mètre de livres; or,on ne pourra pas demain ignorer tous les projets de recherche en cours, aussi bien aux Etats-Unis que dans n'importe quel autre pays; et si on veut semer la totalité de ce qui se fait dans le monde, je ne vois pas nos malheureux chercheurs, et même les responsables de la recherche, pouvoir lire je ne sais combien de volumes; cela deviendra absolument impossible. Il faudra donc, petit à petit, venir à des moyens de communication autre que la forme imprimée comme les systèmes on-line.

Y.EL SAMMANI:I don't think we can fix a cycle of one,three or four years. It will depend on how much the original work inside the country has accumulated to warrant complete publication. I think that project evaluation seminars, mentioned by the Philippines delegate might be useful to give the answer. We have had a little experience in this type of seminar which has not, so far, been very successful. But with a little effort and some incentive, we can improve it. For example, if an investigator knows that the best experts in the field are attending the seminar and could help him, he will be attracted. Then, this could be adopted as a system.

J.E. BROWN: The question I raised was:is it sufficient for a country to have full information about ongoing research only at one time in the year or more frequently?

W. FOSTER: I would like to comment on this point, as well as pursue the discussion that was being raised a little bit further. It seems to me that a multi-functional system is to be preferred to a system of one-time publication or even a series of publications. I would like to recommend to you the International Cancer Research Data Bank programme as an example of what can be done in the way of a multifunctional programme. In this case, while online retrieval of the information is being made available with excellent qua-

lity control, a programme of a series of individual publications is carried on. These publications deal with a very specific subject area, and perhaps as many as a hundred of these subject areas in the course of the year will be covered for the field of cancer. Each one brings together all the work which is available on that subject at the time of preparation and will be prepared rather rapidly within a week or two so that the publication is able to reflect the latest information available.Thus, this multifunctional system will include on-line retrieval for those who have access to computers and want to use this approach, and a large number of very specific publications. I think this combines the advantages of both approaches.

E. DE GROLIER: Jusqu' à présent il me semble qu'on n'a pas beaucoup de possibilité d'étendre aux recherches en cours le système SDI utilisé pour les travaux publiés. Est-ce qu'il ne serait pas possible, éventuellement sur une base internationale ou nationale, d'organiser dans les centres chargés d'enregistrer les recherches en cours, des services de diffusion sélective de l'information comme pour les travaux publiés?

J.E. BROWN: Yes, certainly. In Canada, we have considered this but we have done nothing about it, although I understand that SSIE is operating an SDI service of this type. Am I right?

W. FOSTER: We have been operating an SDI system for some time. This is based on a periodic mailing to individuals who have special interests in research and want to receive everything which we get in that subject area. These arrangements were made on either a monthly, quarterly, semi-annual or even annual basis, so that an individual who wants to make sure that he receives everything that comes in on a regular basis, simply requests the SDI approach. We have computer programmes which will identify who receives what at what time and this seems to operate rather well.

E. SAMAHA: I think it is too early now to decide which form and which periodicity is better because the scientific community all over the world is not familiar with current research information systems, as far as I know. The utilisation of this system in the future will condition their developments and will impose the best way to produce the information. Anyhow, I agree that we shall need both printed form and on-line service. The printed form, a yearly publication for example, has some advantages, even when we consider older issues. Scientists could go through these publications to have some ideas, to reorient themselves, to identify the fields of more interest.Maybe this is more helpful for the developing countries than it is for the developed ones where sophisticated research is being carried on.

J.E. BROWN: So, ideally we should have printed volumes and also on-line systems for everybody who is rich.

Closely related to what we have been discussing, I would like to throw the following question to the Panel: - suppose you have a manual system which is working very well, at what point do you decide or feel that this should be converted to a computerized system? Does any member of the panel have any experience as to the particular point at which one can switch on and not necessarily give up the manual system but consider using computers to handle the work?

D.E. TORRIJOS: In the case of the Philippines project, we have reached a point where we feel that we should already embark on mechanising our system because the time involved in retrieving the information from our manual system is too long, and that is one basic consideration. Another consideration is, when you reach a point where the number of inputs to your system is staggering, I think you have to do something about it.

H. HOGEWEG-DE-HAART: I think, apart from retrieval difficulties which are closely connected with the amount of information you have, it is also a question of analysis of all the data you have in your system which is fairly difficult to do if you have only a manual system. We have reached in our social science information system about 10 000 items of current research projects and research reports which is not very much but we are in the stage of considering automation now partly for the sake of retrieval but also because we want to do a better analysis of the data by making the link between them. I mean data on methods, on approach, on financial matters or other variables which should be analysed, I think, by computerizing the system, even when the number of projects does not warrant automatizing for retrieval purposes.

A. ROMDHANE: C'est une question que je voudrais poser aux membres du groupe: supposez qu'un pays en voie de développement démarre maintenant un centre d'information sur les recherches en cours,faut-il qu'il utilise d'emblée un système automatisé ou un système manuel?

D.E. TORRIJOS: Since I am from a developing country, I think our experience would be quite useful for you. Computerization is very advisable. However, one should determine first the level of know-how of the users. There is no point in going into computerization if the users do not know how to use the kind of information you get out of a computerized system. On the other hand, I don't think that most developing countries could afford the computerized system.

W. FOSTER: I think the question of computerization should also be based on practicalities. If a manual system serves the purpose, if the volume of material lends itself to manual handling, if the types and the number of questions being received lend themselves to functioning with a manual system, then by all means a manual system is indicated and it is less expensive; it can be more efficient. You can exert excellent quality control when you are dealing with a small file in the hands of very careful and confident people. My recommendation is that you should tie up to the nature of the file and the nature of the use and the volumes.

R. SAUTEREY: Je crois que pour répondre à cette question il faut savoir si l'on conçoit un système d'information sur les recherches en cours ou un système documentaire en général. En ce qui nous concerne, les informations sur les recherches en cours sont une partie d'un système de documentation générale couvrant l'ensemble des documents publiés; ce qui est je crois un avantage, car en dehors de la publication spécifique du volume annuel traitant des recherches en cours, les recherches apparaissent automatiquement dans le fonds documentaire global, que ce soit en recherches rétrospectives ou en diffusion sélective de l'information. Autrement dit, la recherche en cours est intégré au fonds documentaire global. Le système a commencé donc en 1965. De 1965 à 1971 il a fonctionné en procédure manuelle et à partir de 1971 la masse des informations à traiter était telle que le recours à des procédures informatiques a été nécessaire. Cette conversion s'est échelonnée de 1972 à 1974 et à l'heure actuelle le système foncionne d'une façon complètement informatisée et, à titre indicatif, en ce qui concerne les recherches en cours, on traite environ 4000 projets par an.

J.E. BROWN: In Canada we initiated the system as a computerized system right from the very beginning, simply because we had the computer facilities, the expertise and the necessary software package. So, as Mr. FOSTER was saying, certainly, if you have the computers available and the people to do it, it is, I would think, a good idea to switch to a computerized system when the data you are sotring gets to enormous proportions. How about some other comments from people who have had experience in this?

A. NEELAMEGHAN: I did mention this morning a directory of ongoing research in our universities which in 1974 contained about 9400 entries. First we computerized the index to the directory because we needed it first for retrieval, and now we have taken up the computerization of the main part, the directory part itself. Another reason why we have now gone in for computerization is that we are adding to it ongoing research information from other scientific research institutions which would increase the number of projects to about 15 000 per year. The same data base would ultimately include also information facilities in the country /a directory is already being prepared/, information about data centres and their services and what we call the Indian scientific literature output every year. So, in order to get the whole thing working as a system, we find it necessary to computerize it. When we have this data base we can make various compilations using computers much better than we can do it manually, like for example the list of experts in various fields, etc.

E. DE GROLIER: Je crois que l'on peut recommander très fortement aux pays en voie de développement d'intégrer leurs services et j'irais dans le sens de M. SAUTEREY. Je prends l'exemple du Maroc où j'ai été pendant quatre mois cette année. Il y a un service semi-automatisé qui ne porte pas sur les recherches en cours, mais qui porte sur le répertoire rétrospectif des recherches déjà faites. Et bien, dans ces conditions, il y aurait beaucoup à dire pour intégrer à ce service le répertoire des recherches en cours et d'autres répertoires comme ceux que vient de mentionner M. NEELAMEGHAN.C'est une façon de rentabiliser l'ensemble. Il serait à mon avis tout à fait ridicule de commencer un index manuel des recherches en cours alors qu'on a déjà un service qui traite d'une manière semi-automatisée des recherches déjà faites et des rapports de recherches déjà publiés. C'est peut-être une occasion pour automatiser davantage le système.

E. SAMAHA: About this problem of computerization, I think that in the developing countries, a feasibility study should be done first, and for the purpose of this feasibility study, I would suggest that a centre would start a test on a package of notices of projects and try to put it on computer and find what the various problems are. But, suppose that this feasibility study is done and the computerization of the system is considered, I am afraid that if every country starts now building its own system, in a few years, another meeting should be held to discuss the interconnection and compatibility between the different systems used. What really should be done on an international level, is to start first on standardizing the input for this information - we are not all aware of the progress made in this direction. The problem of the normalization of the project description to my knowledge has still to be solved. For instance, if you ask several investigators to describe their projects they will not describe them in a uniform and systematic manner to enable efficient indexing.Many considerations in the area of standardization should precede the use of a computer, especially in developing countries.

J.E. BROWN: Yes, I think you are perfectly right. This question of standardization is very important. It seems to me that we would need almost another session to really deal with this question.

M. EL HADI: Concerning this topic of automation versus conventional methods, I would like to state here that we are living in an era of changes surrounded by modern systems that we, in developing countries, have to go with these trends and go in the era of computation. I did a study of the information facilities in Africa and found that most of the African countries have some sort of computers in one way or another, but the problem actually is how to use these facilities. On the other hand, we must consider the unity of information. Most of us are developing documentation services and should build data bases, not only for research in progress but also for research and training institutions and other various statistics in R & D. Whether we should start on a national, regional or international basis, this is a very important and crucial problem. Of course, work on an international basis will reflect on the regional and on the national, but work should go both ways from the national, to the international or the regional and vice versa. Thus, the three elements have to be taken into consideration.

J.E.BROWN: May I thank the Panel very much for participating in this discussion and particularly thank all of you who have made my task very easy. I pass over the chair to our President to close the session.

D. HERSEY: Thank you very much Dr. BROWN.I would like to thank all the speakers and moderators for their participation today. I would also hope that after today's session in the initial period of recognizing one another and certainly following the reception tonight, we will feel that we know each other well enough to have a more vigorous discussion and wide participation of the audience in the next two days. I know that when meetings like this begin, there is always a general tendency to hang back and not ask a question, but we encourage you to do so. It is of course not possible to hear everybody and have everybody's viewpoint but we do want to get as many people discussing the papers and the questions which are being taken up by the panels, so please feel free to do that.

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Session II

Part 4

Paper 12

Summary

INFORMATION SYSTEMS AND SERVICES IN ONGOING RESEARCH IN SCIENCE, THE INDONESIAN CASE: PROBLEMS AND PROSPECTS

The Indonesian Institute of Sciences is in the process of developing a system and services for the management of ongoing research information. The system and services are needed for the following purposes:

1. to support science policy makers and research managers;
2. as information for scientists and research workers;
3. to follow research and development activities in science and technology in Indonesia; and
4. as a tool for the comparative study of development in science and technology in Indonesia as compared to other countries.

Difficulties encountered in the system on ongoing research projects are primarily based on the limited mechanism for systematic collection and dissemination of information and the lack of standardized scientific terms.

Approaches used at the moment for identifying the data elements are based on the contents of yearly reports of research institutes and universities, research project proposals, ongoing research projects and research reports. The data elements identified are the activity, the manpower, the budget, the equipment and materials, the result and the field of science of the projects.

The prospect for an information system and services on ongoing research projects depend on the improvement of the mechanism for systematic data collection and the dissemination of this information. In the future, the Indonesian Institute of Science plans to periodically publish directories of ongoing research on a fully computerized basis.

Résumé

SYSTEMES ET SERVICES D'INFORMATION SUR LES RECHERCHES SCIENTIFIQUES EN COURS LE CAS DE L'INDONESIE: PROBLEMES ET PERSPECTIVES

L'Institut indonésien des sciences a entrepris de mettre en place un système et des services pour le traitement de l'information sur les recherches en cours. Ce système et ces services doivent répondre aux fins suivantes:

1. aider ceux qui sont chargés d'établir la politique scientifique et de gérer la recherche;
2. informer les scientifiques et les chercheurs;
3. suivre les activités de recherche et de développement scientifiques et techniques en Indonésie;
4. permettre l'étude comparative du développement de la science et de la technologie en Indonésie et dans les autres pays.

Les difficultés rencontrées proviennent essentiellement des limitations des moyens de rassemblement et de diffusion systématiques de l'information et de l'absence de terminologie scientifique normalisée.

Pour déterminer les éléments de données, on se fonde actuellement sur le contenu des rapports annuels des instituts de recherche et des universités, sur les avant-projets de recherche, sur les projets de recherche en cours et sur les compte-rendus de recherche. Les éléments de données retenus pour chaque projet sont l'activité, le personnel, le budget, l'équipement et le matériel, les résultats et la discipline scientifique.

L'avenir du système et des services d'information sur les projets de recherche en cours dépend de l'amélioration des moyens de rassemblement systématique des données et de diffusion des informations. L'institut indonésien des sciences a l'intention de publier ultérieurement de manière périodique des répertoires des recherches en cours établis entièrement par ordinateur.

INFORMATION SYSTEMS AND SERVICES IN ONGOING RESEARCH IN SCIENCE, THE INDONESIAN CASE: PROBLEMS AND PROSPECTS

S. ISMUSUBROTO - N. HARJANTO

Introduction

The Indonesian Government's policy with regard to science and technology as expressed in the First Five Year Development Plan, 1969/1970 - 1973/1974, was that it should support development strategies, such as the proper application of science and technology, to increase the welfare of the people.This necessitates the development and expansion of scientific resources to be utilized in development programs.To support the implementation of research in development programs several factors are necessary such as:

1. the creation of a climate favourable to research activities, both politically as well as economically;
2. the availability of up-to-date scientific literature;
3. the availability of adequate funds; and
4. the availability of qualified research workers and technicians in adequate quantity.

To fulfil these requirements, the First Five Year Development Plan has put emphasis on the rehabilitation and development of existing basic facilities of science and training of scientific manpower and technicians 1/. In continuation and enhancement of this, the next step during the Second Five Year Development Plan, 1974/1975 - 1978/1979, is as follows:

1. the national development of science and technology; and
2. the application of science and technology for development.

One of the many steps to accomplish this would be the encouragement of scientific communication, both among scientists themselves as well as among scientists and the community. Besides the methods used so far such as workshops, symposiums and soforth, awareness of ongoing research projects should be established as another way of communication. This will bring about the necessity to draw and publish an inventory of research projects, in particular ongoing research projects. This would inform scientists and research

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1/ From 1960 on, due to economic difficulties and increasing inflation, a decline in scientific activites could be witnessed. However, since 1968 the national economy stabilized, and as the importance of science and technology to development was recognized, efforts to improve scientific resources in the country were undertaken. This was reflected in the First Five Year Development Plan.

workers of research that has been done and is being done in their field of interest, and may form a basis for communication and therefore a better-coordinated plan for research may be implemented along with other benefits derived from data collected.

The need for an information system

Guidance and coordination of research activities during the Second Five Year Development Plan serve the following purposes:

1. to increase the effectiveness of research activities to support and secure development efforts for the short- as well as the long-term period;
2. directing thoughts to and examining events which may have an influence on development efforts at the long-term;
3. to determine priorities on research activities carried out for a short- as well as long-term period; and
4. to use effectively all budget resources available, from the country as well as abroad.

To meet this goal, information on scientific and technological potential should be acquired, which consists of the following[2]:

1. information on scientific and technological manpower, in particular R & D workers;
2. information on scientific facilities, in particular for R & D;
3. investment or expenditure on scientific activities, in particular on R & D activities; and
4. information on scientific activities, in particular R & D activities.

Regarding the first point data acquisition on R & D manpower is being done starting with R & D manpower in research institutes under Ministries and Non-Ministerial bodies /except the Ministry of Defence and universities/, which resulted in two publications[3]; in progress is the processing of compiled data on scientific manpower in state universities as part of a survey on R & D manpower. Data acquisition for the other three points are being carried out. Rather than circulating questionnaires for each point on different times, two kinds of questionnaires are requested to be filled in at the same time. One questionnaire is on the second and third points and one is on the fourth point. Data on the latter will be the input for an information system on ongoing research projects[4].

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[2] During the period 1969/1970 a survey was conducted, by the Indonesian Institute of Sciences, on scientific facilities which included scientific workers, instruments /adequacy, not kind/, budget and research projects. The survey covered research institutes under Ministries and Non-Ministerial bodies,except for the Ministry of Defence and state universities. The result was published in 1972 as the "Directory of Research Institutes and Related Activities under Ministries and Non-Ministerial Bodies". Research projects collected were not mentioned in the publication nor published in any other way. This was the result of the first effort done to collect data on research activities. The next was to collect data on research projects through the collection of project proposals to the National Development Planning Board /BAPPENAS/; however, using this approach a clear overall picture of research projects being conducted by state research institutes and agencies could not be obtained.

This system will have the following objectives:

1. to support science policy makers and research managers;
2. to supply information to scientists and research workers;
3. to follow research and development activities in science and technology in Indonesia; and
4. as a tool for the comparative study of development in science and technology in Indonesia as compared to other countries.

Problems encountered

Problems that have been encountered in the past were the slow or no response of research institutes to questionnaires. Since there do not exist any regulations requiring research workers to register their projects, the only way to overcome this problem would be to publish reported research projects, thereby trying to make them aware of the importance of such a service. From past experience, in the case of scientific manpower and technicians in research activities, it has worked fairly well and resulted in a supplement of the publication mentioned before[3]. The questionnaire on ongoing research that is in circulation at present, is supported by the Minister of State for Research, which is one other way to solve the problem. Still another way worth mentioning is if a formal appointment is made to the Indonesian Institute of Sciences to set up an Information System and Service for National Science Policy Planning.

Another problem has been to make up a representable list of scientific terms, and definitions as well as scientific disciplines and their groupings[5].

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[3] "Hasil Pengumpulan Data Survey Tenaga Kerja di Indonesia di Bidang Penelitian dan Pengembangan di Lembaga2 Penelitian dalam Lingkungan Departemen dan Lembaga2 Non-Departemen, 1971-1972" /"Results of a Survey on R & D Manpower within Research Institutes under Ministries and Non-Ministerial Bodies, 1971-1972"/, Jakarta, 1972.
"Directory of Manpower within Research Institutes under Ministries and Non-Ministerial Bodies" and Supplement, Jakarta, 1973.

[4] Other information systems are: 1. on R & D manpower;
2. on scientific facilities; and
3. on expenditures in scientific activities, in particular R & D activities.
The four systems will support science policy makers. An information system on research activities and results is one of the five national programme of the Minister of State for Research.

[5] Definitions used were taken from a variety of sources, a major part from UNESCO publications.

The Department of Higher Education and Cultural Affairs periodically makes available a list of research projects conducted in state universities and agencies within the Ministry. The National Development Planning Board does the same for research projects/surveys based on project proposals. Unfortunately, they are not compatible with the system design.

Data elements

Data elements identification were based on the contents of yearly reports of research institutes and universities, research projects proposals, ongoing research projects and research reports, which resulted in the following data /see Annex I/:

1. basic or administrative data;
2. field of science;
3. scientific activity:
4. manpower;
5. budget; and
6. abstract or summary.

The system

The system is designed to be a computerized system, although at present a part of it will be done manually /the processing of abstracts/ for the following reasons:

1. the total of abstracts expected as a start is approximately 1000-1500;
2. the Indonesian Institute of Sciences does not have a computer and uses a computer service;
3. document retrieval by computer is not yet applied in Indonesia. Although there are quite a few people experienced in computerized data processing, none is known to be experienced in computerized document storage and retrieval. Therefore some studies and experiments must be done first; and
4. at present are expected queries on abstracts to be based on disciplines or project titles rather than key-words or descriptors; using the latter also requires training of users. With the expected amount of abstracts, their retrieval can be handled manually.

At present the system will produce the following output:

1. list of research project titles, project number and matching field of sciences;
2. list of research projects by field of sciences grouped according to major field of sciences;
3. list of research projects by performing institutes;
4. list of research projects by principal investigator; and
5. list of field of sciences, code number and group category.

These lists will all be arranged alphabetically. Publications of lists 2, 3 and 4 will be sent to science policy-makers, research managers and principal investigators of research projects, from whom feedback to the system may come. Lists 1 and 5 will be filed at the Indonesian Institute of Sciences for query purposes and may be used as reference to abstracts whenever only the project title is mentioned or only the field of sciences for abstracts of all projects in that field.

A card catalogue of abstracts will be prepared and completed with key-words and filed alphabetically. At a later stage this will be put on the computer.

Computerization

Although only about 1000-1500 project titles are expected, the system will be computerized for the following reasons:

1. statistical tables may be constructed which may be cumbersome to do by hand;

2. research projects will hopefully increase year by year for which computerized processing will become necessary.A small number of projects to start with would be easier to manage.The time lag between the return of questionnaires and output of the system would be hopefully shorter than if the processing was done manually; and

3. the computer service used so far for other purposes charges a minimal price.

Prospects

The next step will be to provide key-words to each abstract of research projects. The best people to do it would be scientists trained in documentation techniques.

After having acquired sufficient experience in computerized document storage and retrieval techniques, the system can be fully computerized, tentatively by 1977.To achieve this purpose a budget should be made available for studies and experiments.

With the reorganization of Ministries since Augusut 1974, there will be a coordinating unit of research projects in each Ministry. If a formal institutional link between these units and the Indonesian Institute of Science can be established, the collection of data for research projects can be simplified.Forms for the collection/updating of data on research projects may be standardized and held at each coordinating unit and sent yearly to the Institute to be processed. For units which want to publish their own research directories it would be recommended that the systems are compatible with that of the Indonesian Institute of Sciences. Through the directories of research projects, scientists and research workers are kept informed about research activities done recently or in progress; therefore, better coordination and planning of R & D activities can be accomplished, which is one of the major goals of the Second Five Year Development Plan with regard to science and technology.

ANNEX I

Data elements of research projects

Administrative data

1. project number
2. title of project
3. name of institution

Scientific data

4. field of science /if multidisciplinary, a maximum of three/

Activity data

5. kind of activity:

    Research:

    1. basic research
    2. applied research
    3. experimental development

    Services:

    4. survey/data collection
    5. standards
    6. scientific information
    7. other

6. month and year of start
7. month and year of finish
8. depository of report
9. in cooperation or not

Manpower

10. principal investigator
11. total number of full-timers
12. total number of part-timers

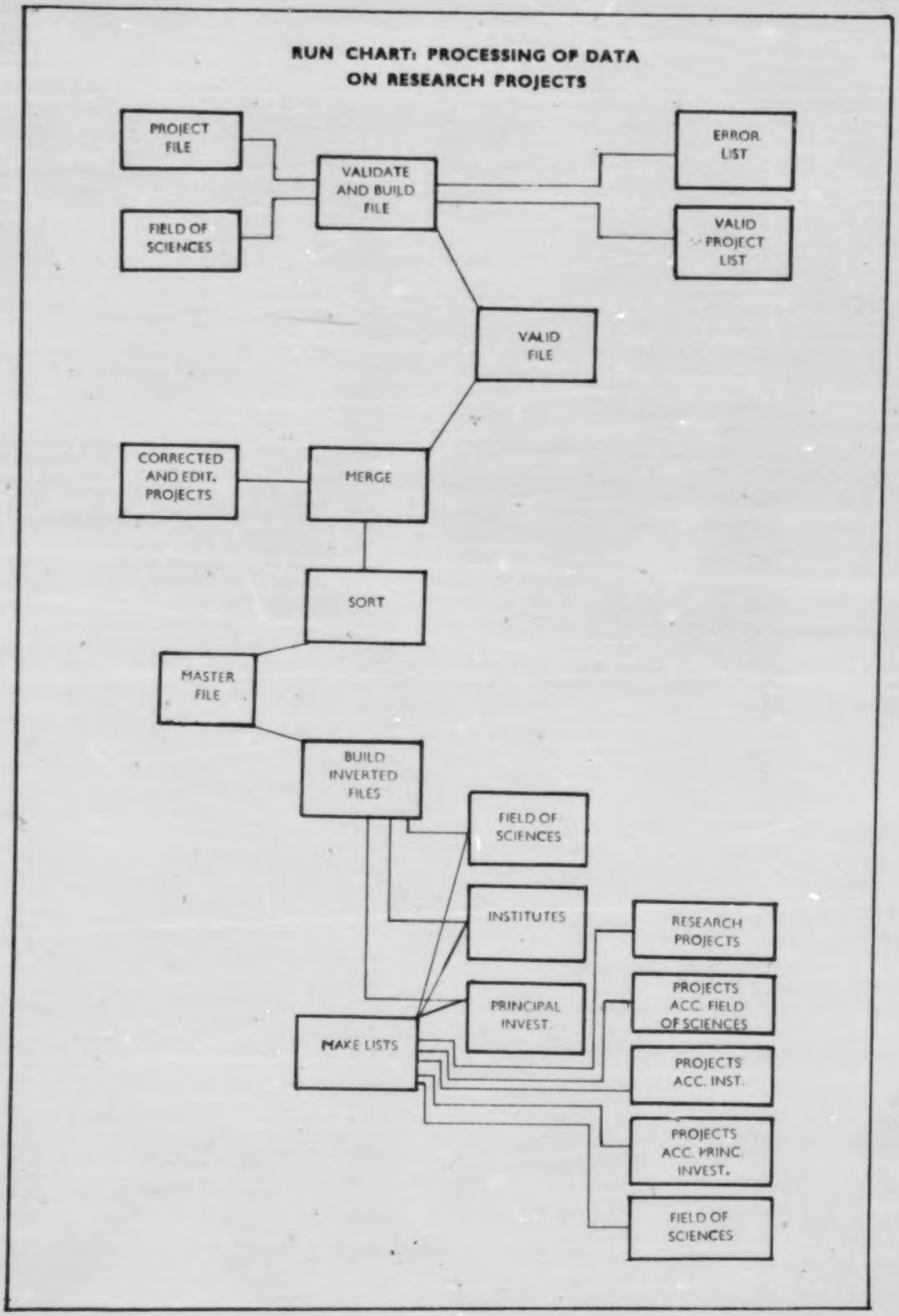
Budget

13. total budget
14. budget resources

Information

15. abstract or summary

ANNEX II


RUN CHART: PROCESSING OF DATA ON RESEARCH PROJECTS

PROJECT FILE
FIELD OF SCIENCES
VALIDATE AND BUILD FILE
ERROR LIST
VALID PROJECT LIST
VALID FILE
CORRECTED AND EDIT. PROJECTS
MERGE
SORT
MASTER FILE
BUILD INVERTED FILES
FIELD OF SCIENCES
INSTITUTES
PRINCIPAL INVEST.
MAKE LISTS
RESEARCH PROJECTS
PROJECTS ACC. FIELD OF SCIENCES
PROJECTS ACC. INST.
PROJECTS ACC. PRINC. INVEST.
FIELD OF SCIENCES

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Session II

Part 4

Paper 13

Summary

A PILOT PROJECT IN THE CONVERSATIONAL TREATMENT OF ONGOING RESEARCH PROJECTS IN THE FIELD OF AGRICULTURE

Whatever the field of activity under consideration, there is a universally felt need today for lists of ongoing research projects. This explains why the preparation of many lists in a large number of fields has been going on for some time. Quantities of information are thus being amassed and the problem of processing this stock of information is becoming more and more acute since present systems for processing documentary stocks seem ill-adapted to the specific needs of ongoing research projects.

For this reason BNIST /Bureau National de l'Information Scientifique et Technique/ in cooperation with INRA /Institut National de Recherches Agronomiques/ decided to launch a pilot experiment in the processing of ongoing research projects, using the ARIANE system developed by CATED /Centre d'Assistance Technique et de Documentation de l'Union Technique Interprofessionelle des Fédérations Nationales du Bâtiment et des Travaux/. This system makes use of the network organisation principle which, unlike traditional structures which begin by defining a question which remains fixed even if it can be improved a posteriori, seeks to reconstruct an interrogation process imitating the natural process of reasoning, i.e. associating with each idea a chain of ideas among which the successive choices take place naturally.

This experiment has two aims:

- first of all to test the potential of ARIANE for the processing of ongoing research projects, using about 1000 projects as a basis;
- secondly, and more especially to evaluate the cost-effectiveness ratio for the experiment and in the case of the later extension of the system to other fields of science and technology.

Résumé

UNE EXPERIENCE PILOTE DE TRAITEMENT EN MODE CONVERSATIONNEL DES PROJETS DE RECHERCHES EN COURS DANS LE DOMAINE AGRICOLE

Le besoin d'inventaire des projets de recherche en cours est actuellement universellement ressenti quel que soit le secteur d'activité envisagé, c'est pourquoi, depuis quelque temps de nombreux inventaires sont entrepris dans un grand nombre de secteurs.

Des fonds d'information se constituent donc et le problème de traitement de cette masse d'information devient de plus en plus aigu, car les systèmes actuels de traitement de fonds documentaires sembelent peu aptes à répondre aux besoins spécifiques des projets de recherches en cours.

C'est pourquoi le BNIST /Bureau National de l'Information Scientifique et Technique/ en coopération avec l'INRA /Institut National de Recherches Agronomiques/ a décidé de lancer une expérience pilote de traitement des projets de recherches en cours en utilisant le système ARIANE développé par le CATED /Centre d'Assistance Technique et de Documentation de l'Union Technique Interprofessionnelle des Fédérations Nationales du Batiment et des Travaux/. Ce système utilise le principe de l'organisation en réseau qui contrairement aux structures classiques qui définissent à priori une question figée, même si cette dernière peut être améliorée a postériori, cherche à reconstituer un processus d'interrogation imitant le raisonnement naturel, c'est-à-dire associant à chaque idée un train d'idées parmi lesquelles les choix successifs s'opèrent naturellement.

L'objectif de cette expérience est double:

- tout d'abord tester les possibilités d'ARIANE vis-à-vis du traitement des projets de recherches en cours sur un fonds d'environ 1000 projets;
- ensuite et surtout, d'évaluer le ratio coût/efficacité pour l'expérience et dans le cas d'extension éventuelle du système a d'autres domaines de la science et de la technique.

UNE EXPÉRIENCE PILOTE DE TRAITEMENT EN MODE CONVERSATIONNEL DES INFORMATIONS SUR LES RECHERCHES EN COURS DANS LE DOMAINE AGRICOLE

S. CHAMBAUD

Si l'on désire créer un outil rentable, il faut que celui-ci soit en mesure, tout d'abord de répondre à des questions de niveaux variables allant du spécifique au générique afin d'attirer la plus large clientèle possible /du gestionnaire de recherche au chercheur/, ensuite il doit permettre de traiter indifféremment tous les secteurs. Seul l'ensemble des projets de recherches en cours du domaine IST /environ 50 000 en France/ justifie l'existence d'un système automatisé.

Ces deux impératifs impliquent deux stratégies possibles:

- soit on utilise un système classique de traitement de fonds documentaires que l'on modifie afin qu'il puisse tenir compte des exigences énoncées ci-dessus. Cette solution qui ne nécessite pas de gros investissements au départ, implique par contre des coûts de fonctionnement importants au niveau de l'indexation et de l'interrogation en raison de la taille vocabulaire devant être utilisé;

- soit on conçoit ou on utilise un système qui dans sa structure est adapté au problème spécifique de la gestion des informations sur les recherches en cours: on optimise alors les frais de fonctionnement mais un investissement relativement lourd est cependant nécessaire pour initialiser le système.

Ainsi lorsque nous nous sommes posés le problème de la gestion automatisée des informations sur les recherches en cours, nous nous sommes trouvés devant cette alternative: utiliser un système classique ou développer un système original. Notre choix a cependant été facilité du fait de l'existence en France d'un système du 2ème type qui semblait à priori pouvoir assez facilement être transformé pour gérer les projets de recherches en cours, ce système est ARIANE développé par le CATED /Centre d'Assistance Technique et de Documentation de l'Union Technique Interprofessionnelle des Fédérations Nationales du Bâtiment et des Travaux Publics/.

Pourquoi avoir choisi le système ARIANE? Avant de répondre à cette question il est essentiel d'exposer brièvement la philosophie du système ARIANE.

I - Le système ARIANE

L'originalité de ce système réside dans le fait qu'il utilise le principe de l'organisation en réseau qui cherche à reconstituer un processus d'interrogation imitant le raisonnement naturel, c'est-à-dire associant à chaque idée un train d'idées parmi lesquelles les choix successifs s'opèrent naturellement.

Pour ce faire, au sein même de l'ordinateur est constitué un réseau résidant de façon permanente en mémoire: les noeuds symbolisant les concepts, et les arêtes, les liaisons logiques ou analogiques existantes entre ces divers concepts, à chaque noeud est associé un "tiroir" où sont rangées les informations associées.

Ce type d'organisation facilite à la fois l'indexation et l'interrogation du fonds, en effet:

- l'indexation est considérablement facilitée car elle est assistée par l'ordinateur, l'indexeur ayant constamment sous les yeux le réseau de concepts et donc les analogies auxquelles il doit penser,

- l'interrogation est effectuée de manière conversationnelle en cheminant dans le réseau de la façon suivante:

1. On se positionne sur un noeud de départ qui est déterminé en replaçant la question dans son contexte et donc en reprenant le niveau le plus générique de la question;

2. On consulte la liste des noeuds connectés au point de départ;

3. On choisit le noeud apportant un supplément d'information pour la question posée;

4. On se repositionne sur ce nouveau noeud;

5. On réitère le processus;

6. On stoppe la progression lorsque l'on estime avoir suffisamment d'informations et à ce moment on appelle le tiroir attaché au noeud pour obtenir les informations associées.

Ainsi l'interrogation est effectuée en langage naturel sans pratiquement aucun apprentissage car les noeuds sont libellés de façon explicite, de plus l'utilisateur a la possibilité d'enrichir sa question grâce aux analogies qui lui sont signalées lors du parcours du réseau.

Pour ce qui est de la mise à jour du réseau, deux procédures sont envisageables:

- soit directement "on line" en visualisant la partie du réseau pertinente, on crée alors le concept nouveau et les liaisons correspondantes;

- soit, si il semble que la mise à jour doive toucher beaucoup de noeuds, et si l'on pense qu'il y a un risque d'oubli de création de certaines liaisons, on peut alors utiliser un système classique documentaire à base de mots-clé qui est intégré dans ARIANE. Ainsi chaque noeud est caracterisé par une suite de mots-clé et lors de la mise à jour on réalise /en batch/ une recherche de tous les noeuds ayant un rapport quelconque avec le concept nouveau en utilisant un vocabulaire qui se crée automatiquement lors de l'introduction des nouveaux concepts.

En fonction de ce qui vient d'être dit, pourquoi avoir choisi ARIANE pour le problème spécifique des recherches en cours?

- Tout d'abord, parce que sa structure réticulaire de concepts permet un cheminement allant du générique au spécifique et donc permet de répondre à des questions de niveaux très variés;

- Ensuite, il parait possible d'étendre la structure en réseau considérablement car la gestion en est automatique et la manipulation aisée car conversationnelle;

- Et enfin, parce que la mise à jour des informations qui dans le cas des projets de recherches en cours, touche environ 50% des informations tous les ans /puisque la durée de vie d'un projet est en moyenne 2 ans/ est particulièrement simple.

Maintenant que nous nous sommes convaincus de l'intérêt que présente ARIANE pour notre problème, voyons la façon dont a été réalisée l'application aux recherches en cours.

II - Application d'ARIANE à la gestion des informations sur les recherches en cours

Notre expérience s'est déroulée en quatre phases successives:

1. choix du domaine d'application,

2. réalisation intellectuelle du réseau de concepts,

3. enregistrement informatique du réseau et des informations associées,

4. essai et évaluation du système.

II - 1 Choix du domaine d'application

Nous nous somme fixés à priori un certain nombre de contraintes pour ce choix:

- le domaine devait être suffisamment étroit pour permettre la réalisation de l'expérience avec un budget limité;

- le domaine devait être cependant suffisamment étendu et d'intérêt général pour autoriser par la suite une extrapolation des résultats.

Compte tenu de cela nous avons été amenés à choisir le secteur des Productions végétales en Agriculture qui satisfaisait les deux critères précédents:

- assez étroit puisqu'il comporte environ 1000 recherches en cours déjà recensées par l'INRA /Institut National de Recherches Agronomiques/;

- pas trop spécifique puisqu'il fait appel à des disciplines très variée.

II - 2 Réalisation intellectuelle du réseau de concepts

Cette étape la plus délicate du projet a duré environ 4 mois, et a nécessité la participation à l'élaboration du réseau à la fois de spécialistes de l'INRA, et de spécialistes du système ARIANE.

Le réseau ainsi généré comporte actuellement 1000 concepts couvrant les domaines suivants: Amélioration des plantes,
Bioclimatologie.

La méthodologie adoptée pour créer ce réseau a été la suivante: le point de départ a été les diverses classifications et thésaurus dont disposait l'INRA, à partir de ces documents un premier réseau très simpliste a été élaboré et ensuite progressivement complété en utilisant les compétences de divers spécialistes du domaine.

II - 3 Enregistrement informatique du réseau et des informations associées

Cette étape consiste simplement à réaliser les bordereaux correspondant au réseau de concepts et aux informations associées, à les faire perforer et ensuite les enregistrer en machine /un ordinateur IBM 370-158 : l'ensemble des programmes ARIANE occupant 150 K/.

Ces informations sont alors structurées à l'aide des programmes utilitaires du système ARIANE.

II - 4 Evaluation du système

Evaluation technique

Il est essentiel tout d'abord d'énoncer les services que l'on peut attendre du système.

1. Réponses à des questions ponctuelles:

- quels sont les projets traitant de tel sujet?
- qui travaille sur tel sujet?
- où travaille-t-on sur tel sujet?
- sur quels sujets tarvaille tel chercheur?
- quels sont les chercheurs rattachés à tel laboratoire?
- quels sont les thèmes de recherche de tel laboratoire?

etc.

2. Edition: Il est possible à partir de ce système d'obtenir un certain nombre d'index:

- index des chercheurs
- index des laboratoires
- index des projets de recherche
- index des thèmes de recherche

etc.

Il est aussi possible d'obtenir à la demande le point de la recherche sur tel ou tel domaine.

Le système comporte des modules permettant d'obtenir ces éditions en photocomposition.

3. Aide à la décision

Grâce à la structuration qui est faite des informations et grâce au mode de consultation, le système offre aux décideurs une aide efficace leur permettant:

- d'appréhender l'environnement d'un thème de recherche et donc de décider si ce thème a été suffisamment exploré;
- de déterminer de nouveaux axes de recherches;
- de mettre en évidence des duplications de travail.

4. Gestion administrative des recherches

Dans le cadre de cette expérience pilote, cet aspect n'a pas été pris en compte mais étant donnée la structure du système il serait pariculièrement simple de l'incorporer en ajoutant pour chaque projet dans un "tiroir" administratif toutes les informations que l'on jugerait nécessaire de faire figurer.

Evaluation économique

Comme je l'ai dit en introduction, un système aussi sophistiqué que celui-ci ne peut s'envisager que si l'on se fixe comme objectif de traiter l'ensemble des projets de recherche du domaine scientifique et technique.

Cependant il est intéressant de faire le bilan économique de cett expérience:

- frais d'investissement: 150 000 F
- frais de fonctionnement pouvant être répartis en:
  - . frais fixes /stockage, maintenance systeme, etc. .../
  - . frais variables.

Dans l'état actuel des choses la partie fixe représente un gros pourcentage des frais de fonctionnement, cependant on peut estimer à environ 500 F le coût de l'heure de connexion au système en comptant une connexion de deux terminaux, 2 heures par jour.

Il est évident que ce coût horaire ira en décroissant lorsque le nombre d'heures de consultation et le nombre de terminaux iront croissant.

Conclusion

A la lumière de cette expérience et bien que l'on ne soit pas encore en possession de tous les résultats, il apparaît clairement que le système ARIANE peut s'appliquer de façon efficace à la gestion des informations sur les recherches en cours.

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Session II

Part 4

Paper 14

Summary

RESEARCH INFORMATION SYSTEM IN IRAN

In the past three years I have been in charge of collecting and processing information with regards to scientific research both at the Ministry of Science and Higher Education and at the Institute for Research and Planning in Science and Education. In this effort I have mostly used the collection methods described in the UNESCO Publication No. 15, the Manual for Surveying National STP.

In the paper, the computerized method, which I have designed to process the ongoing research information, is described. The method is specifically adapted to the status of scientific research in Iran where most scientific research is done at the universities and a few government research institutions. The method has been applied successfully to research personnel, research budgets and the research results.

Résumé

LE SYSTEME D'INFORMATION SUR LA RECHERCHE EN IRAN

Depuis trois ans, l'auteur est chargé d'assurer le rassemblement et le traitement des informations relatives à la recherche scientifique à la fois au Ministère de la Science et de l'Enseignement Supérieur et à l'Institut de recherche et de planification de la science et de l'éducation. Dans ce travail, il a surtout employé les méthodes de rassemblement décrites dans la publication No. 15 de l'UNESCO: "Manuel d'inventaire du potentiel scientifique et technique national".

Dans son document, il decrit la méthode informatique qu'il a conque pour traiter l'information sur les recherches en cours. Cette méthode est spécialement adaptée à la situation en Iran où la plus grande partie des recherches scientifiques sont effectuées dans les universités et quelques organismes publics de recherche. La méthode a été appliquée avec succès aux informations conernant le personnel de la recherche, les budgets de recherche et les résultats des recherches.

RESEARCH INFORMATION SYSTEM IN IRAN

A.A. BEIHAGHI

Perspective

First I would like to give you a brief description of the R & D situation in Iran, then I would embark on the existing information system and services in ongoing research in science. Scientific research in Iran has been carried out in universities and some ministries for a number of years. Research activities have been intensified with the rapid growth and industrialization of Iran in the last decade, as a number of research institutes have been established either within the university system or as a part of such Ministries as Agriculture, Health, Energy, Science and Industries. The newly established National Scientific Research Council, under the auspices of Her Imperial Majesty Empress FARAH, is a major breakthrough towards setting up national goals and priorities for research in Iran. Meanwhile in 1971 the National Council for Promotion of Scientific Research was established at the Ministry of Science and Higher Education. This Council, through its various committees, evaluates and provides funds for research projects in all fields of scientific endeavour. In the last four years, 395 research projects have been funded by the Council, of which 76 projects have been completed. However, universities and research insitutes affiliated to Ministries have their own research budgets and support their own research programs.

The total budget for the Council during its first year of activity /1971/ was only 150 000 dollars, but for the year 1975 its budget has increased to about 3 million dollars. The total government expenditure on R & D /excluding defense/ during 1974 amounts to 120 million dollars which has quadrupled during the last five years. It is interesting to note that our expenditure on R & D has been in direct proportion to the growth of our Gross National Income in that period. The breakdown on research expenditure to various research activities is given in Annex A.

For Iran, with a population of over 30 million, the total stock of economically active scientists, engineers and technicians is close to 200 000, where the personnel engaged in R & D is estimated at about 20 000.

A major project launched by the Ministry of Science and Higher Education is currently underway aiming at determining Iran's scientific and technical potential. Part of this project is to design a computerized research information system to process information collected on manpower, expenditure, physical facilities and equipment, scientific publications and ongoing research projects.

Another major effort to gain quick access to a world network of scientific information systems has been the establishment of a National UNISIST Committee affiliated with the Iranian National Commission for UNESCO.

Existing Research Information System

The rapid accumulation of new knowledge makes it difficult for the scientific community of Iran to keep in touch with all aspects of scientific progress. Clearly Iran cannot set up its own independent system, but the Ministry of Science and Higher Education is exploring, with other countries, how scientific societies in Iran can quickly gain access to the use of these systems. It is obvious that the UNISIST programme can serve the purpose well.

Besides the full survey of Iran's Scientific and Technical Potential which is being carried out by a group of consultants under a contract with the Ministry of Science and Higher Education, a partial survey of academic staff of Iran's higher education institutes was recently completed by the Institute for Research and Planning in Science and Education. The kind of information collected consists of the statistical data and other information necessary as inputs to the continuing assessment of the status and condition of research in the public sector and to all the other planning activities engaged in at the Ministry of Science and Higher Education. Close to 10 000 questionnaires from the academic and research staff of Iran's 150 higher education institutes have been collected during 1974-75 academic year. Each questionnaire contains the following information on individual researcher.

1. Personal information /name, date and place of birth, sex/;
2. Address /institute's, division, unit/;
3. Education /degrees, fields of education, university, country, years degrees obtained/;
4. Job Information /in the last five years/;
5. Employment Status;
6. Experience /in teaching or research/;
7. Foreign Languages;
8. Research and Teaching Load;
9. Research Fields of Interest;
10. Research Activities /completed or in progress/;
11. Research Plans for Future;
12. Scientific Publications;
13. Research Problems and Suggestions;
14. Other Comments.

The first step in storing the above information has been to assign to every document /questionnaire/ a unique identifying code or aquisition number. This eight digit code consists of three parts:

- A three-digit code for the institute where the person is employed;
- A three-digit code representing the field of his or her research or educational activity /See Annex B for fields of research codes /;
- A two-digit sequential number.

All other information listed 1 through 14 /except first and family names/ has been numerically coded, filling almost entirely one 80-column IBM card. Therefore, 10 000 IBM cards have been punched and the total information being stored on a magnetic tape. To retrieve the information for any specific purpose, a computer program is written and the computer output is taken as printed tables, lists, and others. Thus, by using the internal capabilities of both the Ministry of Science and Higher Education and the Institute for Research and Planning in Science and Education in collecting, checking, classifying and coding of research information, and then by processing the information at a university computer center, a highly versatile and efficient research information system has been developed. At the present time the Ministry is installing its own computer, thus a complete in-house capability will soon be developed.

REFERENCES

1. Manual for Surveying National Scientific and Technological Potential. UNESCO Publ. No.15.

2. MELVILLE, Sir Harry. Science Policy and Organization of Research /IRAN/. UNESCO, March, 1969.

3. CADE, J.A. Science Policy and Planning of Research /IRAN/. UNESCO, March, 1972.

Annex A

BREAKDOWN OF GOVERNMENT'S R & D EXPENDITURE

The total amount of the research budget allocated by the government for the year 1969 was about 35 million dollars. This figure represented 0,37 per cent of the gross national product of that year. At the present time, the total funds estimated for research in the year 1975 amounts to 150 million dollars, about 0,36 per cent of the estimated gross national product of 1975. It is, therefore, noted that the ratio of research budgets to the gross national product has been almost constant during the past seven years. It should be pointed out, however, that these figures do not include budgets earmarked for defense research or money spent by the private sector for research purposes.

During the past seven years, an average of 86,7 per cent of the total research budgets has gone to Ministries and their affiliated departments, 11,8 per cent to Universities and higher education institutes and 1,5 per cent to charitable organizations.

Further, during the past seven years an average of 74 per cent of the total research budget has been spent on research dealing with economic affairs, 22,4 per cent on social affairs, and finally, 3,6 per cent on public affairs.

On the whole, during the past seven years research budgets have been divided with the following proportions between various research activities:

1.	Agricultural development	32,5	per cent
2.	Development of water resources	28,0	"
3.	Education	14,0	"
4.	Hygiene, medical treatment and nutrition	5,0	"
5.	Supplies of Electricity	4,4	"
6.	Transportation and roads	2,6	"
7.	Development of mines	2,5	"
8.	Development of industries	2,3	"
9.	Affairs connected with manpower	1,0	"
10.	Publication of news and information	0,9	"
11.	Development and renovation of villages	0,8	"
12.	Trade promotion	0,8	"
13.	Post and communications	0,8	"
14.	Social Welfare	0,7	"
15.	Management of financial affairs	0,7	"
16.	Government buildings and establishments	0,7	"
17.	Tourism	0,6	"
18.	Leadership of executive power	0,5	"
19.	Execution of internal policy	0,4	"
20.	Technical and general services	0,4	"
		99,6	

	99,6
21. Regional development	0,2 per cent
22. Manpower administration	0,1 "
23. Arts and culture	0,08 "
24. Physical education	0,02 "
Total:	100,00 per cent

It can be well noticed from the above table that research budgets earmarked for only two divisions, that is Agricultural Development and Development of Water Resources, accounts for more than 60 per cent of the total research budgets of Iran.

Annex B

FIELDS OF RESEARCH CODES

The classification given below is based mostly on the classification of Fields of Science defined in UNESCO Publications. It has been expanded and rearranged somewhat to do the following:

1. To correspond to Iranian alphabet.
2. To correspond to the existing fields of educational and research activities at Iran's higher education institutes.

100 - Law

110-119 International Law
120-129 Islamic Law
130-139 Judicial Law
140-149 Criminal Law
190-199 Related subjects

200 - Social Sciences

210-219 Social Relations
220-229 Economics
230-239 Commerce
240-249 Cooperatives
250-259 Sociology
260-269 Geography
270-279 Psychology
280-289 Public Administration
290-299 Political Sciences

300 - Humanities

310-319 Theology
320-329 Archeology
330-339 History
340-349 Linguistics
350-359 Persian Literature, Culture & Language
360-369 Foreign Literature, Culture & Language
370-379 Philosophy
380-389 Library Science
390-399 Related Subjects

400 - Medical Sciences

410-419 Public Health
420-429 External Diseases
430-439 Internal Diseases
440-449 Surgery
450-459 Basic Medical Sciences
460-469 Pharmacy
470-479 Dentistry
480-489 Paramedicine
490-499 Related Subjects

500 - Education

510-519 Education
520-529 General Education
530-539 Physical Education
540-549 Technical Education
550-559 Secondary Education
560-569 Higher Education
570-579 Vocational Education
580-589
590-599 Related Subjects

600 - Natural Sciences

610-619 Mathematics
620-629 Geology
630-639 Biology
640-649 Chemistry
650-659 Physics
660-669 Astronomy
670-679 Meteorology
680-689 -
690-699 Related Subjects

700 - Agriculture

710-719 Agronomy
720-729 Horticulture
730-739 Animal Husbandry
740-749 Food Industries
750-759 Rural Industries
760-769 Agricultural Machinery
770-779 Gardening
780-789 Living Environment
790-799 Soil & Water

800 - Engineering

810-819 Electrical Engineering
820-829 Nuclear Engineering
830-839 Chemical Engineering
840-849 Civil Engineering
850-859 Industrial Engineering
860-869 Metallurgy and Material Science
870-879 Mine Engineering
880-889 Mechanical Engineering
890-899 Related Subjects

900 - Arts

910-919 Architecture and City Planning
920-929 Music
930-939 Painting
940-949 Sculpture
950-959 Decorative Arts
960-969 Dramatic Arts
970-979 Design
980-989
990-999 Related Subjects

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Session II

Part 4

Paper 15

Summary

THE DATA BANK FOR RESEARCH AND DEVELOPMENT PROJECTS OF THE GERMAN FEDERAL MINISTRY FOR RESEARCH AND TECHNOLOGY - DAVOR

In 1972 the Federal Ministry for Research and Technology installed a data bank for the projects which are sponsored by the Ministry. In the paper the aims of the data bank - supply of information in the form of documents and statistics, preparation of decision making tools, progress follow-up and control, evaluation of a project at completion - and their realisation are described.

At the end of the paper, a survey is given of the distribution of information about ongoing research in the Federal Republic of Germany.

Résumé

LA BANQUE DE DONNEES SUR LES PROJETS DE RECHERCHE ET DE DEVELOPPEMENT DU MINISTERE DE LA RECHERCHE ET DE LA TECHNOLOGIE DE LA REPUBLIQUE FEDERAL D'ALLEMAGNE - DAVOR

En 1972, le Ministère Fédéral de la Recherche et de la Technologie a mis en place une banque de données pour les projets auxquels il accorde son soutien. L'exposé décrit les objectifs de la banque de données - fourniture d'information sous forme de documents et de statistiques, préparataion des instruments de prise de décision, examen suivi de l'exécution et contrôle de l'avancement des projets, évaluation des projets après leur achèvement et donne un aperçu des réalisations obtenues.

Pour terminer, l'auteur étudie la diffusion de l'information sur les recherches en cours dans la République Fédérale d'Allemagne.

THE DATA BANK FOR RESEARCH AND DEVELOPMENT PROJECTS OF THE GERMAN FEDERAL MINISTRY FOR RESEARCH AND TECHNOLOGY - DAVOR

H. HEINRICH

The Federal Ministry for Research and Technology /Bundesministerium für Forschung und Technologie - BMFT/ in Bonn awards numerous grants for research and development projects to academic and industrial bodies throughout the Federal Republic, and in some cases to foreign bodies. The number of these projects increased from 1618 in 1969 to 2345 in 1972. Therefore, some rationalization of the administrative system was necessary, and it was decided to introduce a computer-based information system in 1972. The system is called DAVOR, a contraction of "Datenbank für Förderungsvorhaben" /Databank for sponsored projects/.

The main aims of the data bank are as follows:

a/ supply of information in the form of documents and statistics;

b/ preparation of decision-making;

c/ progress follow-up and control; and

d/ evaluation of a project at completion.

With a view to the limited manpower, the development and implementation of DAVOR was divided into two stages, DAVOR 1 and DAVOR 2. DAVOR 1 accomplishes the aims a/ and b/ and DAVOR 2 the aims c/ and d/.

The realization of DAVOR

We use the software package FIDAS /Formular-gesteuertes interaktives Datenbanksystem = formula-controlled interactive data bank system/. FIDAS was developed by the Company for Mathematics and Data Processing /Gesellschaft für Mathematik und Datenverarbeitung /GMD/, which is located near Bonn in St. Augustin. The user language of FIDAS is called IDAS /Interaktives Datenbank-Abfrage-System = interactive data bank inquiry system/. IDAS was specified by the BMFT and realized by the GMD. IDAS consists of three modules:

- SESOR /Selektieren, Sortieren, Rechnen = select, sort, calculate/
- IREG /Interaktiver Reportgenerator = interactive report generator/
- GRAFIK /Interaktive Erstellung von Grafiken = interactive drawing of graphics/

FIDAS is running on a Siemens computer 4004/151 under the operating system BS 2000. FIDAS uses disc files which are organized index-sequential.Each record of a file represents one research and development project and contains about 100 fields. The records and the fields are of variable length, but the number of fields are fixed. The first record of each file contains the file description, that means the names of the data fields and their maximum length.

Each record has a key of 8 characters. The key is followed by a pointer field, these pointers indicate the beginning of each data field within the record. In this manner the requirement for storage space is minimized in a first step. Secondly, all data are encoded and compressed to two-thirds of normal length. For input and update we use visual display units /VDU/ of the type Siemens 8150 with 20 lines of 54 characters. According to our experience, on-line input and update lead to fewer mistakes than the use of punched cards.

Each record contains, inter alia, the following information:

- the payee with full address;
- the performing department of the payee or the performing organization if different from the payee, both with full address;
- the subject of the R & D project;
- a more detailed but short description of the project;
- descriptors, key words;
- the leader of the project;
- the beginning and the end of the project;
- financial data;
- some systematics;
- information on reports containing the results of the project.

We produce four main types of output:

- sheets of basic information for each project /Grundkarten/ which are used by the Ministry's departments;
- lists of projects according to specific conditions of selection, for example research program, Ministry's department/s/ involved, financial data and so on;
- tabulated evaluations of all projects or groups of projects;
- quick answers to ad hoc questions.

To produce this output we are using IDAS, which was mentioned above. The module SESOR is used for selection, calculation and sorting. Selection: it is possible to select records according to specific criteria, for example all projects relating to a given payee, all projects being performed in a given town or region of the Federal Republic, etc. Furthermore, it is possible to combine several conditions using "and", "or" and "nand". Each element of data can be used as a criterion of selection, just as parts of elements, groups of elements, numeric and alphanumeric constants. Calculation: the user is able to perform calculations on the numeric fields of the records. This function may also be applied to given values for each project which are not kept on the record, for example cash already paid as a percentage of the total fund granted. Calculations may also involve the accumulation of totals, maxima, minima, and averages for given fields or calculated values. This may also be done for groups of projects. Sorting: the selected records may be sorted according to specified fields, groups, or calculated values.

The output of a run of SESOR can be displayed directly on a screen of a VDU or can be stored in another disc-file. Afterwards, this file can be used as an input file to the modules IREG or GRAFIK.

The user of IREG has to give parameters for arranging the output in lists or tables to indicate which information should be printed in which column and on which line, which information should be used as the header of the page or as the header of specific column, etc. There are many possibilities. Before the output is sent to the line-printer, the user can induce IREG to store the output in a print-out file. Sections of this file can be displayed on a screen as though it were a window. This enables the user to check the output before he gives the command for printing. If the output is not correct, the user can go back to give other parameters for arranging the output. This function of IREG is very useful and saves much time.

GRAFIK allows bar diagrams or curves to be printed out on a screen, on a line printer, or on a microfilm plotter /off-line/. Graphs will normally be restricted to values accumulated for groups. They can be orientated horizontally or vertically.

All modules of IDAS have a peculiarity: the control-parameters for the modules as criteria of selection, conditions, etc. can be stored as a "format". Each format is stored in a format-file under a name given by the user. In this manner, it is very easy to use IDAS for producing lists and so on which are required regularly.

Distribution of information about ongoing research DAVOR is used by the Ministry of Education and Science, too. Each of the two ministries publishes annual research catalogues which contain all projects which are funded in that year. Furthermore, it supplies information to external clients of the BMFT, such as members of the Federal Parliament, interested members of the public /Germans as well as foreigners/, upon request. DAVOR is planned to be used for all projects which are funded by any Federal Ministry. This will start next year.

A year ago, the Federal Government concluded the program for promotion of information and documentation. One of the purposes of this program is to concentrate the more than 200 documentation centres existing today into 16 specialized information systems /Fachinformationssysteme = FIS/. The FIS are to collect and give information on literature, and data as well as on ongoing research. To enable the FIS to do the latter task, it is furthermore planned to establish a research information office. This office is to act as a clearinghouse for the FIS with regard to information on current research. It is also to undertake a statistical evaluation of financial and other non-scientific aspects of research and will act as a national partner for corresponding international information systems.

It seems to me that the necessity to provide information about ongoing research is recognized in the Federal Republic, and the activities which are started or planned will be a valuable contribution to the solution of this problem.

DISCUSSION, Session II, Part 4.

Moderator: S. PASSMAN
Director,
Division of Scientific Research
and Higher Education
UNESCO

S. PASSMAN: I am particularly pleased to participate in this conference. As Mr. HARRISON mentioned yesterday, there are several divisions in UNESCO that are involved in this area. My own division concerning scientific research and higher education is particularly interested in the utilisation of tools such as a current research information system to promote cooperation in research and to try to bring about the best utilization of research resources towards the solution of some pressing problems of development in the more industrialized countries. So, we are particularly anxious to be able to derive from this conference some mechanism for promoting cooperation and research and we hope that some of the sessions here will deal with that aspect of the subject as well.

Discussion of the paper by S. ISMUSUBROTO

H. ARNTZ: Do you have an estimate, Madam, of the percentage of your national research carried through in your national language, Indonesian, and the percentage in other languages, like English?

S. ISMUSUBROTO: All entries are in Indonesian.

H. ARNTZ: Have you any difficulties with the terminology in your national language?

S. ISMUSUBROTO: Yes, indeed, because most of the time we don't have the Indonesian translation for the international terms which are mostly in English. So, we are also considering making the abstracts in English but I don't know whether it will be possible.

S. PASSMAN: I noticed that in your prospects on applying keywords, you indicate that the best people to do that assignment would be scientists trained in documentation techniques. I wonder if this is likely to be a prospect, or whether it's difficult to attract scientists into that type of work?

S. ISMUSUBROTO: Actually they would be the best people to do it but they are not enough interested in documentation and it is very difficult to attract them into this area.

Discussion of the paper by S. CHAMBAUD

A.ROMDHANE: J'ai deux questions à vous poser: Premièrement vous avez dit que vous travaillez en étroite collaboration avec l'IRA, France, est-ce que votre système est compatible avec les systèmes internationaux dans le domaine agricole et je pense surtout à CARIS. Deuxièmement, si, par exemple, un centre vous demande des informations, sous quelle forme lui fournissez-vous cette information? et est-ce que c'est payant ou c'est gratuit?

S. CHAMBAUD: Je réponds d'abord à la première question relative à la compatibilité avec les systèmes internationaux. Notre système a une structure

assez particulière qui implique, au niveau des échanges, un certain nombre de problèmes, mais à priori cette compatibilité a été envisagée et il n'y a aucun problème de fond entrainant une incompatibilité avec d'autres systèmes et en particulier CARIS. Pour ce qui est de la seconde question relative à la fourniture des informations, pour l'instant ce problème n'a pas été envisagé puisque le système est encore dans sa phase expérimentale. De plus, je crois que ce sera à l'IRA de décider du mode de fonctionnement de ce système.

G. TREVISAN: J'ai deux questions à poser à M. CHAMBAUD; la première d'ordre général: est-ce que vous prévoyez de passer à la phase opérationnelle? et la deuxième purement technique: pouvez-vous nous donner une brève description du bordereau d'entrées?

S. CHAMBAUD: Nous envisageons de passer au stade opérationnel d'abord au niveau du domaine limité de l'agriculture, et ensuite d'étendre progressivement le système à l'ensemble des projets de recherche en cours. Pour ce qui est de la description du bordereau d'entrées, des specimens sont affichés sur un panneau dans la salle de démonstration.

J. MICHEL: Je voudrais ajouter une précision en ce qui concerne la compatibilité: je crois qu'elle se situe à deux niveaux, d'une part au niveau des "data elements" à prendre en compte pour la description d'un projet de recherche, et, d'autre part, au niveau des vocabulaires ou des systèmes d'indexation. Je pense qu'il sera très facile, d'une façon générale, d'obtenir la compatibilité entre les différents systèmes au niveau des "data elements", par contre il sera difficile d'obtenir la compatibilité entre les différents systèmes d'indexation. Déjà le système CARIS de la FAO et le système AGREP des Communautés européennes sont incompatibles au niveau des classifications utilisées.

Discussion of the paper by A. BEIHAGHI

A. ALMASHAT: The paper which was delivered to us just now was very interesting. I want to ask the speaker about the indexing code he mentioned; whether this indexing code is international or proper to his center. Mr. Chairman, I think it is very important at this time to move ahead for an international and standardized indexing system. This will be of great help for the developing countries and for those countries who did not set up any information centre until now. Another question: Have you any access to ongoing research in other countries and what is the method used for such access?

A. BEIHAGHI: The methods that are used for the classification of the fields of scientific research are a combination of the methods as described in UNESCO publications adapted to the Iranian situation. For example, we use the Persian alphabet for the alphabetical arrangement, but the major fields of research and subdivisions are very close to the UNESCO classification. Concerning the access to the outside literature, we use either national or international existing systems like SSIE and others.

S. PASSMAN: I hope that later discussions towards the end of the meeting will take up again the question of trying to get compatibility and the various ways of commonality in the classification schemes and other aspects of the systems.

M. EL HADI: Would you please elaborate a little bit on the output products of the system of ongoing research in connection with the comprehensiveness and the periodicity.

A. BEIHAGHI: As I mentioned, this activity was just finished a few months ago. Therefore, we do not have many publications yet. But what we can get is obvious, since when you put all the elements of the questionnaire on an IBM card, you can sort it any way you want, for example, one can classify the research activities by institutes, in different fields of activities, one can list who is doing what, and so on.

E. DE GROLIER: Is there any connection with the system used by IRANDOC for the registry of scientific literature in Iran?

A. BEIHAGHI: They are two independent systems, and I believe that theirs is not computerized yet.

E. DE GROLIER: Is there a possibility for merging the two?

A. BEIHAGHI: Yes, I myself am employed by that institute for research and planning in science and education, and, therefore, I am aware of what is going on. As a matter of fact, we are working together on a national survey, covering universities, ministries and private institutions.

Discussion of the paper by H. HEINRICH

E. DE GROLIER: Quel genre de classification utilisez-vous pour la détermination des champs de recherche? Est-ce que c'est une classification tirée de la liste des "Fachinformationssysteme", ou bien c'est une classification à part, ou bien encore est-ce une classification inspirée de la classification UNESCO des champs de recherche?

H. HEINRICH: In our DAVOR system we have today only a so-called "promotion systematic" for the task of the Ministry. Concerning the FIS classification, I apologize that I cannot answer correctly this question because another department in our Ministry has the responsibility for planning for it. But if we have, next year, to cover all projects of all Ministries of the Federal Republic we will have two classifications, a science classification based on the subject catalogue of the German Association of University Teachers and a task classification based on the "Nomenclature générale des activités économiques dans les Communautés européennes".

S. SCHWARZ: Can you give us a figure of the total cost of development of the DAVOR system and is the software available either free or on sale?

H. HEINRICH: We had much luck in using the FIDAS software of the GMT which was only slightly modified, therefore I cannot say how much the costs involved were. This software is available from GMT, for instance, Brazil will be using it. I should add that it is only running today on Siemens Computer Series 4004 151 46 under the operating system PS 2000.

F. KÜCHENBÄCKER: Mr. HEINRICH, you said that you plan a national research information office. Could you repeat the task of this information office? I did not understand it well.

H. HEINRICH: As I mentioned, the role of the FIS is to collect and give all information on literature, on data, as well as on ongoing research. To enable the FIS to do this, it is planned to establish this research information office which will act as a courrier house for the FIS with regard to information on current research. It has to gather all the information about ongoing research and then distribute it to the right FIS.

C. VERNIMB: Mr. HEINRICH, you mentioned that you cover in your data bank only those projects sponsored by your Ministry. What is the number of these projects and what is their percentage compared with all projects sponsored by all the Ministries?

H. HEINRICH: As I said, we started in 1972 registering all projects which are funded by my Ministry and the Ministry for Science and Education. The total is today about 4000 projects and next year we will add the projects funded by the other Federal Ministeries. The additional number is about 3000.

M. EL HADI: I would like to ask Mr. HEINRICH whether he has conducted a users study for his services and if he did so, what are the kinds of users of this system?

H. HEINRICH: As I mentioned, the first purpose was internal, for the Ministry itself. Then we saw that the science communities were interested in information on ongoing research and for that we published an annual research catalogue with quarterly supplements /called quick information/, on projects which started in that time. We also answer requests; we have about 600 requests a year from Members of Parliament and from scientists.

S. PASSMAN: Thank you very much. I would like to thank all the speakers on this session for their very interesting and concise reports.

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Session II
Part 5
Paper 16

Summary

INFORMATION SYSTEM IN ONGOING RESEARCH AND ORGANIZATION OF SCIENTIFIC AND TECHNICAL DOCUMENTATION IN SENEGAL

Since 1970, Senegal has set up with UNDP and UNESCO support, an information service in ongoing research in science. This service operates through enquiries-interviews with research workers, in order to collect basic data which are then stored in three files /research topics, scientific bodies, research workers/.

The data analysis system is based on the OSIRIS informatics programme. A first survey conducted in 1972-73 on the scientific potential was analysed and summed up in a report. A second enquiry is under way.

Our method of analysis of the scientific potential will, nevertheless, have to be applied within the wider range of activities of a national scientific and technical documentation centre.

The scientific and technical documentation potential of Senegal is very considerable and able to meet most users' needs. 400 000 books and 10 000 periodical titles are housed in thirty or so libraries. The main activities of these documentation centres are essentially the conservation of the documents,making it indispensable to direct attention to a more rational use of the mass of international and national documents and to lay down a national scientific and technical documentation policy with a view to harmonious social and economic development.

A National Scientific and Technical Documentation Commission is already in existance but it needs to be given the resources to achieve its aims through the establishment of a national scientific and technical documentation centre. The Interministerial Council on Scientific and Technical Research recently decided to establish such a centre and the Senegalese Government is making every effort to implement this decision in close cooperation with the appropriate international organizations /especially UNDP and UNESCO/.

The National Commission and the National Scientific and Technical Documentation Centre will, among their various tasks, prepare for and carry out Senegal's integration into the UNISIST Programme.

Résumé

SYSTEME D'INFORMATION SUR LES RECHERCHES EN COURS ET ORGANISATION DE LA DOCUMENTATION SCIENTIFIQUE ET TECHNIQUE AU SENEGAL

Le Sénégal s'est doté, grâce à l'appui du PNUD et de l'UNESCO, depuis 1970, d'un service d'information concernant les recherches scientifiques en cours. Le service procède par enquêtes - entrevues auprès des chercheurs pour recueillir des données de base, qui sont regroupées en trois fichiers /thèmes de recherche, unités scientifiques, chercheurs/.

Le système d'analyse des données est basé sur le programme informatique OSIRIS. Une première enquête sur le potentiel scientifique, conduite en 1972-1973 a été analysée et fait l'objet d'un rapport. Une deuxième enquête est en cours.

Toutefois notre méthode d'analyse du potentiel scientifique devra s'insérer dans les activités plus larges d'un centre national de documentation scientifique et technique.

Le potentiel documentaire scientifique et technique du Sénégal est très riche et susceptible de répondre à la plupart des besoins des utilisateurs. Une trentaine de bibliothèques regroupent environ 400 000 ouvrages et 10 000 titres de périodiques. Les principales activités de ces noyaux de documentation sont essentiellement de conserver des documents. Il s'impose alors la nécessité de s'orienter vers une exploitation plus rationnelle de la masse documentaire nationale et internationale et de déterminer une politique nationale de documentation scientifique et technique en vue d'un développement socio-économique harmonieux.

Une Commission Nationale de Documentation Scientifique et Technique est déjà créée mais il convient de lui donner les moyens de réaliser ses objectifs grâce à la mise en place d'un Centre National de Documentation Scientifique et Technique. Le Conseil Interministériel de la Recherche Scientifique et Technique vient de prendre une décision dans ce sens que le Gouvernement du Sénégal s'efforce de mettre en exécution en collaboration étroite avec les organisations internationales compétentes /PNUD et UNESCO notamment/.

La Commission Nationale et le Centre National de Documentation Scientifique et Technique devront, parmi diverses tâches, préparer et assurer l'intégration du Sénégal dans le système UNISIST.

SYSTEME D'INFORMATION SUR LES RECHERCHES EN COURS ET ORGANISATION DE LA DOCUMENTATION SCIENTIFIQUE ET TECHNIQUE AU SÉNÉGAL

D. SENE

Introduction

Une bonne information sur les recherches scientifiques en cours doit nécessairement comprendre deux aspects:

- un aspect descriptif sur les thèmes de recherche en cours et les moyens mis en oeuvre; cela relève de l'analyse du potentiel scientifique et technique;

- un aspect d'appréciation des résultats déjà obtenus; cela relève de la documentation et de l'information scientifiques.

Nous traiterons assez brièvement de l'expérience et des projets sénégalais dans les deux domaines.

Liste des abréviations

DGRST: Délégation Générale à la Recherche Scientifique et Technique

EBAD: École des bibliothécaires, archivistes et documentalistes

IFAN: Institut Fondamental d'Afrique Noire

IDEP: Institut de développement économique et de planification

OMVS: Organisation pour la mise en valeur du Fleuve Sénégal

AUPELF: Association des Universités partiellement ou entièrement de langue française

CESTI: Centre d'études des sciences et techniques de l'Information

I - Système d'inventaire et d'analyse du potentiel scientifique et technique

Grâce à l'appui efficace de l'UNESCO et du PNUD, le Sénégal a mis en place, depuis 1970, un système d'inventaire et d'analyse du potentiel scientifique. Nous décrirons brièvement les différentes phases de ce système depuis la collecte des données jusqu'à la diffusion des résultats en insistant sur la méthode de traitement de l'information.

Il faut signaler d'emblée que l'ensemble des opérations relatives à l'inventaire du PST a été conçu en fonction d'un traitement de l'information par ordinateur.

En effet, c'est un lieu commun de dire que les ordinateurs ont bouleversé de nombreux domaines de l'activité des hommes en rendant accessibles des méthodes de gestion et d'analyse de données insoupçonnées avant leur avènement. Par contre, l'existence de systèmes intégrés de programmes permettant une approche globale des nombreuses opérations élémentaires qui se cachent sous l'appellation de gestion et analyse de données est beaucoup moins bien connue et de ce fait peu répandue en dehors de certains centres privilégiés.

Ces systèmes intégrés repésentent un progrès décisif par rapport aux librairies de programmes et aux paquets programmes statistiques qui étaient seuls disponibles les années 60.

Les critères auxquels doit satisfaire un système intégré peuvent être résumés comme suit:

1. Il doit résoudre l'ensemble des problèmes soulevés par le traitement des données et pas seulement un ou quelques-uns de ces problèmes.

2. Les solutions offertes doivent être assez générales pour satisfaire à un vaste éventail de besoins.

3. La documentation du système doit être compréhensible.

4. Le langage du système doit être raisonnablement simple et uniforme à travers les programmes.

5. Le système doit être vivant, c'est-à-dire évolutif.

C'est un système intégré satisfaisant à ces conditions que la DGRST du Sénégal, avec l'assistance de l'UNESCO, a mis en place et utilisé pour ses traitements de l'inventaire du Potentiel Scientifique et Technique. De ce fait, on peut dire qu'elle a joué un rôle de pionnier en matière de traitement des données pour le Sénégal, car aujourd'hui d'autres services du Gouvernement envisagent d'utiliser ce système pour leurs besions.

Le système choisi sur les conseils de l'UNESCO a été OSIRIS, développé et maintenu par l'Université de Michigan a Ann Arbor. Il a fonctionné à l'entière satisfaction de la DGRST. L'ordinateur utilisé est un IBM 370/145 du Ministère des Finances.

Il existe d'autres systèmes assez semblables à OSIRIS tels que SPSS /Statistical package for the Social Sciences/ et DATA-TEXT pour ne citer que les plus connus, mais le coût d'achat extrêmement réduit /moins de 500 US $/ et l'adoption d'OSIRIS par plusieurs organismes européens de politique scientifique ont paru des avantages décisifs au moment du choix.

La Délégation Générale à la Recherche Scientifique et Technique de la République du Sénégal mene à bien en ce moment son deuxieme inventaire du Potentiel Scientifique et Technique.

Le premier inventaire avait eu lieu en 1972-1973; c'est donc environ trois ans plus tard que la mise à jour prend place.

Ce délai de trois ans paraît suffisant car entretemps, les commissions consultatives de différents secteurs de la recherche viennent apporter annuellement un certain nombre de corrections à l'inventaire. A défaut de couvrir l'ensemble des données recueillies lors de l'inventaire, ces précisions portent cependant sur la partie la plus susceptible d'évoluer c'est-à-dire le contenu des programmes de recherche.

La méthode choisie pour recueillir l'information lors de l'inventaire du PST est celle de l'entrevue avec les chercheurs et les chefs d'unité scientifique. Cette information est regroupée en trois fichiers:

- Unités scientifiques
- Thèmes de recherche
- Chercheurs

Pour le premier fichier, les données sont recueillies au niveau des chefs d'unité, tandis que pour les deux autres, elles le sont au niveau des chercheurs.

- Le fichier unités scientifiques contient un numéro d'identification, le nom, l'année de fondation, le statut juridique, les facilités matérielles et les services dont dispose l'unité ainsi que ses resources humaines et financières.

- Le fichier thèmes de recherche comporte un numéro d'identification, le titre, le coût du thème, les chercheurs qui s'y consacrent, ainsi qu'un certain nombre de caractéristiques /domaine géographique, d'application des résultats, objet de l'étude, liaison avec le plan de développement économique et social, type de recherche, calendrier d'exécution, .../.

- Le fichier chercheurs contient un numéro d'identification, le nom et les principales caractéristiques du chercheur /discipline scientifique de spécialisation, années d'expérience, diplômes, statut, emploi du temps, publications/.

Les informations sont notées lors de l'entrevue sur trois questionnaires distincts; elles sont ensuite perforées /et vérifiées/ sur cartes 80 colonnes et peuvent ainsi être lues par l'ordinateur. Les cartes sont ensuite copiées sur bande ou sur disque magnétique.

Après cela cinq étapes conduiront à disposer de données complètes et vérifiées:

- la détection d'éventuelles cartes manquantes,
- le test de validité des codes,
- le test de compatibilité des codes,
- la correction des erreurs observées,
- la construction d'index et la création de nouvelles variables /éventuellement/.

Le logiciel utilisé, nous l'avons dit, est très économique à l'achat; mais qu'en est-il à l'usage? Là aussi l'ordinateur s'avère un outil très intéressant car, s'il est plus difficile ici de chiffrer la dépense puisqu'elle dépend du volume d'analyse et de l'importance des données à traiter, on peut néanmoins avancer un ordre de grandeur de 1000 a 2000 US $ pour l'ensemble des opérations de préparation et d'analyse des données d'une inventaire, coût relativement modique.

Mais de quoi dispose-t-on exactement au terme de ces traitements et quelle utilisation fait-on des résultats?

Deux utilisateurs principaux tout à fait distincts sont visés: les décideurs en matière de politique scientifique et les chercheurs.

L'organe de décision de la politique scientifique sénégalaise est le Conseil Interministériel consacré à la recherche scientifique et technique présidé par le Chef de l'Etat. C'est devant cette instance qu'est présenté l'état de la recherche dans le pays, ses grandes orientations, ses structures de financement, ses moyens humains et matériels. Au Conseil Interministériel incombe la responsabilité de toutes les décisions majeures de politique scientifique et il est clair que le tableau détaillé qu'offre l'inventaire du PST est un élément essentiel permettant d'éclairer les choix en politique scientifique.

L'autre utilisateur principal intéressé par l'inventaire, c'est, bien sûr, le monde de la recherche scientifique même. Celui-ci s'intéresse plus au détail du contenu des projets de recherche en cours; c'est donc à son intention que des documents tels que la liste des thèmes de recherche par champ d'application ou la liste des chercheurs par discipline scientifique sont élaborés.

Une version abrégée du rapport au Conseil Interministériel est diffusée dans les unités scientifiques qui sont en même temps informées des documents disponibles pouvant être consultés à la DGRST.

Un des grands intérêts des traitements automatiques des données à l'ordinateur est le fait que, une fois créés les fichiers, il est particulièrement simple d'en tirer une présentation ou une analyse particulière auxquelles on n'avait pas nécessairement pensé au départ de l'inventaire.

Si l'analyse du potentiel scientifique et technique est utile, pour concevoir une bonne politique de recherche, elle ne saurait suffire pour asseoir un développement socio-économique harmonieux. Celui-ci repose avant tout sur une exploitation judicieuse des résultats des recherches entreprises,tant sur le plan national qu'international, donc sur une organisation convenable d'un système national de documentation et d'information scientifique.

II - Documentation scientifique et technique au Sénégal: situation actuelle et perspectives

Nous ne nous étendrons pas sur les considérations générales ayant trait à l'importance capitale de l'information scientifique; nous passons en revue assez rapidement le cas concret du Sénégal. Nos sources sont constituées par différents rapports et étude dont notamment:

- Diop /Omar/: l'utilisation des informations bibliographiques par les diplômes de l'Université de Dakar 1972.
- Zidouemba /Dominique/: répertoire des bibliothèques et organismes de documentation-Dakar, EBAD, 1973.
- Basset /Alice/: étude de faisabilité d'un centre national de documentation scientifique /Sénégal, 4 Nov.-1 Déc. 1975/. Paris, UNESCO, 1975.

Situation actuelle

Les utilisateurs potentiels de documentation scientifique peuvent être estimés, sur une population totale de 4 millions, à 25 000 personnes dont environ 6000 étudiants et 400 chercheurs.

Quant au potentiel documentaire, il est constitué par une soixantaine de bibliothèques et centres de documentation qui traitent et surtout conservent l'information scientifique et technique; ils se répartissent ainsi:

23 spécialisés en sciences humaines;

18 pour les sciences exactes et naturelles ainsi que la médecine;

27 pour le développement;

4 ayant un caractère interdisciplinaire.

Ces bibliothèques et centres regroupent une masse documentaire de l'ordre de 400 000 ouvrages et 10 000 titres de périodiques dont 7000 vivants.

La production nationale, très difficile à évaluer, est estimée à 50 000 unités documentaires avec un accroissement annuel de 2000 unités.

En général les bibliothèques et les centres de documentation, à quelques exceptions près, sont bien organisés et l'on y trouve sans trop de difficultés toute la documentation rétrospective et courante. Cependant la documentation souterraine non publiée reste difficile à localiser faute d'organisation et de gestion adéquate.

Avec la création de l'EBAD les Normes de l'AFNOR et ISO connaissent leur application dans certains centres de documentation. Il n'est pas rare de voir quelques bibliothèques spécialisées utiliser des monyens modernes de traitement de l'information /fichiers uniterne, selecto/. Par manque de techniciens sur place, le plus souvent ces débuts sont voués à l'échec. Toutefois, il est à noter qu'une expérience d'avant-garde a vu le jour à Saint-Louis; il s'agit d'une base de données sur mémoire magnétique élaborée par l'OMVS. Son centre de documentation utilise une méthodologie identique à celle de la FAO; plus de 4000 unités documentaires couvrant la région du Fleuve Sénégal y ont été traitées et analysées.

Le flux de l'information circule très mal. La diffusion de listes, d'inventaires, de catalogues et de bibliographie s'opère suivant un système très lent et décevant; aussi la coordination entre recherche et développement en souffre.

Les bibliographies élaborées ont du mal à être publiées. D'autres ont connu des expériences malheureuses; c'est ainsi qu'en 1966 l'IFAN a créé la collection Doc-IFAN; son but était double:

- faire connaître le Fonds du Centre de Documentation;
- former une génération de catalogueurs, de bibliographes et d'indexeurs.

Après une liste d 10 volumes publiés entre 1967 et 1970, la collection est morte par manque de moyens et surtout d'un personnel formé. Dès lors, l'on comprend que le problème du personnel soit une donnée vitale de la documentation scientifique et technique.

L'EBAD et certains Instituts de formation extérieurs, grâce aux bourses octroyées par l'UNESCO et l'AUPELF nous aident à resoudre ce problème.

Il faut noter que le recrutement est difficile au niveau de la maîtrise, le statut en vigueur n'encourageant guère le développement de ce secteur. En général les diplômés de Paris préfèrent conserver leur statut de professeurs avec toutes les pertes que cela implique. Par ailleurs, le recyclage n'est pas tout à fait assuré et souvent nos techniciens se trouvent au dépourvu devant des machines de plus en plus compliquées.

Le support technique. indispensable à la communication et au traitement de l'information existe. Par manque de statistiques nous ne citerons ici que les exemples les plus sophistiqués utilisés et susceptibles de rendre de plus grands services au niveau national:

- L'OMVS, l'IFAN et les Archives du Sénégal disposent d'importants moyens de micro-reproduction;
- Au CESTI /Centre d'Etude des Sciences et Techniques de l'Information/ il existe un atelier moderne semi-professionnel susceptible d'assurer les publications dans de très bonnes conditions.

Dans le domaine de l'informatique, le Centre de Calcul André Peytavin dispose d'un IBM 370/140.

La coordination entre les différents noyaux de documentation laisse à désirer. Les autorités politiques du pays ont pris conscience de l'ampleur du phénomène, devant la récente multiplicité des initiatives en cours d'étude; l'urgente nécessité d'une planification nationale s'impose notamment par la création d'un organisme de concertation et de coordination.

C'est ainsi qu'en Mai 1974, la DGRST organisait la première réunion de la Commission Nationale de la Documentation Scientifique et Technique instituée par la Primature.

Cette commission, par manque d'organismes d'exécution n'a pas encore pu jouer pleinement le rôle qui lui est dévolu. La mission d'un consultant UNESCO-UNISIST /Madame Basset/, à la suite d'une demande de la DGRST /Etude de faisabilité d'un Centre National de Documentation Scientifique et Technique/ constitue un jalon important dans la voie de la création d'un organisme coordinateur et d'exécution de la politique de documentation scientifique et technique.

Le Conseil Interministériel de la Recherche Scientifique et Technique vient de prendre la décision de créer un Centre National DST que le Gouvernement s'efforce de mettre en place en collaboration étroite avec les organisations internationales compétentes notamment avec le PNUD et l'UNESCO.

La Commission Nationale et le Centre National de la Documentation Scientifique et Technique qui relèvent de la DGRST, entre autres fonctions, devront:

- jouer le rôle de conception, de concertation et d'exécution d'une politique nationale de l'information scientifique et technique;
- coordonner et promouvoir dans le pays les activités en rapport avec l'Information scientifique et technique;
- organiser l'entrée des données nationales suivant une méthodologie compatible avec les recommandations de l'UNISIST;
- assurer le transport des informations scientifiques internationales dans les meilleurs délais en fonction des systèmes internationaux existants /AGRIS, INIS, MEDLARS/.

Conclusion générale

Voilà brossé à grands traits le tableau de la situation et des perspectives de développement des systèmes et services d'information concernant les recherches scientifiques en cours. Grâce à l'appui de l'UNESCO et du PNUD, le Sénégal possède déjà un assez bon système pour l'enregistrement et la diffusion des thèmes de recherche en cours. Cet effort doit être complété par la mise en place de bons services de documentation et d'information scientifiques qui nous permettront de nous insérer facilement dans les systèmes internationaux d'information scientifique /UNISIST, AGRIS, etc. .../. Cette deuxième étape est déjà entamée avec l'aide des organisations internationales et en coopération avec les organismes régionaux; l'action devra s'intensifier lors des prochaines années afin que le Sénégal soit doté de structures adéquates et fonctionnelles.

ELEMENTS DU QUESTIONNAIRE THEME DE RECHERCHE

Organisme

Unité scientifique

Numéro du thème

Titre du thème

Objectifs scientifiques

Etat d'avancement: Terminé normalement, en cours, nouveau, programmé, nouveau, proposé, interrompu, abandonné, N.A.

Produit: Inventaire, Connaissance, Méthodologie, Technologie, N.A.

Objet d'Etude

Groupes Cibles: Rural, Urbain, N.A.

Catégories Socio-Professionnelles concernées:

- Salariés secteur primaire
- Exploitants familiaux agricoles
- Entreprises agricoles
- Salariés secteur secondiare ou tertiaire
- Petites entreprises industrielles, artisanales, commerciales
- Grandes entreprises
- Administration
- Corps enseignant et population scolaire
- N.A.

Sexe: Hommes, Femmes, N.A.

Catégorie d'âge: Enfants, Jeunes, Adultes, Vieillards, N.A.

Domaine géographique d'application

Niveau 1: Universel, Intertropical, Afrique de l'Ouest, Sénégal, N.A.

Niveau 2: /Zone écologique sénégalaise/:

- Bassin arachidier /centre/
- Basse et moyenne Casamance
- Est
- Nord
- Zone irriguée par le fleuve

Aspect Formation-Education du thème: Enseignement, Culture, Les deux, N.A.

Poser la question suivante uniquement si la réponse à la question précédente est 1, sinon, passer à la suivante

Niveau d'enseignement:

- Non Scolarisé
- Enseignement Général
- Enseignement Technique
- Formation Professionnelle
- Enseignement Supérieur
- N.A.

Liaison avec le Plan:

- Lié à un projet du 4è Plan
- Lié à un objectif
- Lié à un probleme
- Non lié
- N.A.

Type de recherche:

- Fondamentale non orientée
- Fondamentale orientée
- Appliquée
- Travaux de développement
- N.A.

Probabilité de réussite:

- Faible ou imprévisible
- Moyenne
- Forte
- N.A.

Le thème fait-il partie d'un programme?

Titre du programme

Année de débout du thème

Année de fin prévue

Echéances intermédiaires

Chercheurs participant au thème: nombre et noms

Techniciens participant au thème: nombre

Autre personnel /nombre/

Dépenses de fonctionnement /personnel inclus/

Personnel /en % du précédent/

Sources de financement

T. IWASAKI,
Senior Information Officer,
The Japan Information Center of
Science and Technology /JICST/,
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Session II

Part 5

Paper 17

Summary

COLLECTION AND DISSEMINATION OF ONGOING RESEARCH AND DEVELOPMENT INFORMATION DONE BY JICST

The JICST clearing house service which was initiated in 1972 is currently centered on the annual publication of a "Directory of Public Research Institutions". The three major contents of the Directory are:

1. a research subject index, covering the ongoing research themes in each research institute;
2. a technical affairs index, indicating the tests, inspection, library holdings and personnel training carried out by public research institutes; and
3. an outline of the research institutes, giving the location, telephone number, organization and publications.

To obtain the ongoing research information, questionnaires are sent to nationwide research institutions in science and technology fields. The response is about 90%. The number of research themes is 16 650 covering 401 research institutes in Japan. The plans for future expansion of the service are computerization, ensuring rapidity and diversification in information gathering and dissemination, and preparation of an English version of the Directory to enhance international cooperation.

Résumé

COLLECTE ET DIFFUSION DE L'INFORMATION SUR LES PROJETS DE R ET D EN COURS PAR JICST

Le centre d'information du JICST créé en 1972 consacre actuellement l'essentiel de ses efforts à la publication annuelle d'un répertoire des établissements publics de recherche qui comprend les trois éléments principaux suivants:

1. un index des sujets de recherche, faisant apparaître les thèmes des recherches en cours dans chaque institut de recherche;
2. un index technique indiquant les tests, les inspections, les fonds des bibliothèques et les activités de formation de personnel des établissements publics de recherche;

3. un bref aperçu des instituts de recherche, précisant leur adresse, leur numéro de téléphone, leur mode d'organisation et leurs publications.

Pour s'informer des recherches en cours, le centre envoie des questionnaires aux instituts nationaux de recherche scientifique et technologique. Le taux de réponse est de 90% environ. Le nombre des thèmes de recherche atteint le chiffre de 16 650 pour 401 instituts de recherche du Japon. On prévoit de développer ultérieurement le service en recourant à l'emploi de l'ordinateur pour accélérer le rassemblement et la diffusion d'informations diversifiées et en élaborant une version anglaise de l'Annuaire pour favoriser la coopération internationale.

COLLECTION AND DISSEMINATION OF ONGOING RESEARCH AND DEVELOPMENT INFORMATION DONE BY JICST

T. IWASAKI

1. The current status of information service for ongoing research and development in Japan

Clearinghouse type services

The following three organs in Japan /initiated almost simultaneously/ assumed the work of a clearinghouse, especially providing information services on ongoing research and development.

1. In JICST a directory of research organs is issued for public use, as described fully later. Future plans are to speed up the services by means of computers storing the data, processing the information and disseminating the results.

2. In the Ministry of Agriculture and Forestry, the information is collected on ongoing and planned research works in thirty-one national research institutes and 350 prefectural research institutions under the jurisdiction of the Ministry. The purpose is to facilitate agricultural administration and research management. Machine-readable files are thus prepared, and a computerized information retrieval system is being developed.

   The conventional directories /i.e. Research Subjects of Agriculture, Forestry and Fisheries/ are compiled manually and published.

3. In the Japan Science Foundation, an information retrieval system on ongoing research and development has been developed. The input items are: name of a research institute, name of a research division, classified subjects of research, and the classification code. It retrieves the names of research institutes and the names of research divisions corresponding to the classification code. The classification scheme is called "Classification of Science and Technology".

Conventional Directories of research works

Each Ministry or Agency individually investigates what research planning is ongoing in research institutes within the area of its jurisdiction, and compiles and issues the directory.

1. The Science and Technology Agency surveys the research projects of 92 national research institutes in Japan. Consequently, each year "National plans of research works" is issued. Its contents consist of the research subjects, research divisions and sections, terms of research and research budget for the respective institutes.

2. The Ministry of International Trade and Industry /MITI/ surveys the research projects of sixteen research institutes under the jurisdiction of MITI. "Plans of the research insitutes" is thus issued each year. Its contents are the research subjects, research personnel, research expenditure and summaries of research works for research institutes. Then, the following listings are also attached: a/ research workers, including school course, academic degree and research subjects; b/ classified research works in 24 areas of electronics, ocean-resource development technology, etc; c/ licenses granted to private firms of the patents obtained in national institutes which are assigned to the states.

3. Ministry of Education

   "Classified research subjects of the University personnel" is issued. University personnel consists of 50 000 research workers in natural science.

2. Clearinghouse type service in JICST

Outline of JICST

Established in 1958, The Japan Information Center of Science and Technology /JICST/ has the following functions: publication of "Current Bibliography on Science and Technology", which is an abstract journal prepared by collecting and processing the documents from both within and without the country; reproduction and translation of the documents upon request; and literature and patent searches upon request. The Current Bibliography on Science and Technology, consisting of 10 fields, is prepared by computer; SDI service and magnetic tape files have been made available since 1972. Study is now in progress on the so-called on-line search service.

Practice of clearinghouse service

In 1966, the study on the basic policy of science and technology promotion in Japan was made. Based on this study and other discussions, a nation-wide system of the dissemination of science and technology information /the NIST: National Information System of Science & Technology/ was drafted in 1969. In the NIST project, JICST is designated a general, comprehensive information center in Japan. As the part of this function, JICST started a clearinghouse service. As its first step, in 1972, the "Directory of public research institutions" was initiated, providing ongoing research information. The latest is the 3rd edition. Following is a description of the 2nd /1974/ edition of the Directory.

1. Collection of the information on research works

   Questionnaires of a specific form are sent every year to about 600 research institutes in the fields of science and technology, medicine, and agriculture. The questionnaire is of the fill-in type. To ensure a high response rate, some items which are already available are filled in beforehand. From the second questionnaire and on, a reproduced copy of the preceeding one is sent; thus the necessary work to complete the questionnaire is deletion and addition.

   The items of inquiry in the questionnaire consist of name of an organization, its location, telephone number, research subjects both in progress and being planned, and the research divisions and sections concerned.

2. Classification of the research subjects differing from the case of conventional directories, which are merely a listing of the respective research organs with research subjects, the essence of the Directory is "what research is being done in what institute?" There-

fore, the information derived by questionnaires is classified according to the subjects. The subjects classification is assigned to the research subjects by means of the classification table used in compilation of the Current Bibliography of Science and Technology. The Universal Decimal Classification /UDC/ is assigned to the research subjects in medicine and agriculture. The total number of classifications is 1282 /886 in science and technology, 182 in medicine and 214 in agriculture/.

3 Arrangement of the research-subject card

To arrange the research subjects by classifications,the research-subject card /mark sensing card/ is prepared,which contains research subjects,research organ,research division and section,and the classification-code.The classification-code column is smeared with an ink,and sorting is made with a "Card Selector".The arranged cards /according to a classification table/ are then placed in specially designed card trays.Inserting them,the copies are obtained for listings preparation.The resulting lists are then incorporated into the directory.

4. The number of research subjects

The total number of research subjects is 16 656 as net. The cross-referenced ratio is 1.53, so the number of cross-referenced research subjects is 8815. The gross total turned to be 25 471.

5. Others; collection of the research documents and preparation of a document catalog

Free copies of the research documents and annual reports have been received from national and public research institutions. They are partly abstracted in Current Bibliography of Science and Technology. A documents catalog has been prepared, containing about 3000 documents thus collected. Plans are to being including the individual technical reports and making available the list of titles classified in subjects.

Future plans in JICST

Expanded plans of the service in the next several years are as follows:

1. As further information sources, other national, public research, educational institutions and research institutes of the private firms will be added. By this means, nearly all of the research institutions in the country could be covered.

2. Summaries of the research subjects and names of the research workers will be added as a new item in the questionnaire. Through the summaries, subject analysis can be made more accurately. Then, by means of the names appearing in it, a survey on the researchers, a guide of the research workers and so on becomes available.

3. By the expansion indicated above, research subjects and research workers may cover almost all the research in Japan.

4. The data from questionnaires in 1976 are to be processed by computers.

5. Plans are now in progress on the on-line service of document information in the near future. Along with it, clearinghouse service on-line will be available.

6. Referral service is planned not only by means the conformation sources held in JICST, but also other directories.

7. The English version of the Directory is one of the planned items.

Conclusion

1. Need for the service

The demand for clearinghouse services is not extremely high at the present moment. However, it is expected that the demand will be raised as the amount of information increases and the service is speeded up.

2. Financial matter

The large increase of personnel, and also of expenditures, is essential in order to ensure versatile information services such as high capacity of information processing, increasing processing speed computerized information retrieval, on-line service and so on in the future. The rise in governmental subsidies is hereby anticipated.

3. Identifying essential data elements

The fundamental data elements for the service are acquired through questionnaires. Work on recovering the questionnaires is quite laborious.

4. Cost of the service

In the future, computer processing will be introduced, so the cost of inputting the data is newly added to the total cost. It has been requested that we obtain a large increase in governmental subsidies. As for the computer and the input/output devices, the same equipment that is used for Current Bibliography on Science and Technology can be utilized.

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Session II

Part 5

Paper 18

Summary

THE RESEARCH REGISTER OF THE TECHNICAL RESEARCH CENTRE OF FINLAND

A computer-based research register has been set up at the Technical Research Centre of Finland. The goals of the research register are:

- to give information on ongoing research at the Technical Research Centre;
- to give advice in research planning and in research administration;
- to assist in technical information service activities.

The following information on the research projects is compiled in the register:

- the name of and all codes related to the research project;
- time-table information;
- financial information;
- organizational information;
- information on contacts with other research projects;
- information describing the research projects.

The research register, compiled in Finnish, contains an abstract of every research project with the UDC notation, key words in English, the UNESCO classification by scientific fields, and the OECD classification for research objectives.

Information on new research projects, starting from 1970, is compiled in the register. New projects are added, and the register is listed for internal use quarterly. Information on old projects is revised once a year. A year book with essential information on projects in progress is also distributed outside the organization.

A committee appointed by the Ministry of Education is investigating the possibility of setting up a National Research Register. The information system for the register at the Technical Research Centre has been planned so that it can be applied to the registration of research projects at other institutes.

Résumé

LE REGISTRE DE LA RECHERCHE DU CENTRE FINLANDAIS DE RECHERCHE TECHNIQUE

Un registre informatique des recherches a été établi au Centre finlandais de recherche techniques. Les objectifs de ce registre sont les suivants:

- donner des informations sur les recherches en cours au Centre de recherches techniques;
- guider la planification et l'administration des travaux de recherche;
- fournir une assistance aux services d'information technique.

Le registre donne les informations suivantes sur les projets de recherche:

- le nom et tous les codes relatifs au projet;
- le calendrier des travaux;
- le financement du projet;
- l'organisation du projet;
- les relations entre le projet et d'autres projets de recherche;
- la description du projet.

Le registre des recherches établi en finlandais, contient une analyse de chaque projet dans la notation CDU, avec les mots-clefs en anglais, la classification de l'UNESCO par domaines scientifiques, et la classification de l'OCDE pour les objectifs de recherche.

Depuis 1970 on incorpore au registre les renseignements sur les nouveaux projets qui sont ajoutés aux autres; une liste est établie chaque trimestre pour usage interne. Les informations sur les projets anciens sont révisées une fois par an. En outre,un annuaire donnant les informations essentielles sur les projets en cours est diffusé à l'extérieur.

Un comité constitué par le Ministère de l'Education étudie la possibilité de créer un Registre National de la Recherche. Le systeme d'information du registre du Centre de recherches techniques a été concu de maniere à pouvoir être utilisé pour l'enregistrement des projets de recherche d'autres instituts.

THE RESEARCH REGISTER OF THE TECHNICAL RESEARCH CENTRE OF FINLAND

K. TIRRONEN

General

The Technical Research Centre of Finland is subject to the Ministry of Trade and Industry and carries out research, development and testing of materials. The Research Centre comprises 36 activity units which employ about 400 research officers and 1000 other personnel.

There are three research divisions at the Research Centre. Their fields of activity are building technology and community development, materials and processing technology, and electrical and nuclear technology. In addition, there are administrative offices and the Technical Information Service. The 32 laboratories of the Research Centre work under the three divisions.

The duties of the Technical Information Service include dissemination of information, publishing activities, documentation of technical knowledge and liaison with the Finnish Scientific Attachés abroad.

Setting up of the Research Register

The field activities of the Research Centre is very wide. The large amount of information produced by these activities in research made it necessary to study the setting up of a research register in addition to other publishing activities. The preliminary investigation supported the need of the register. It was decided that the research register would be implemented by means of a computer-based information system.

Due to the interest of the State Administration in the research register, the planning of the system was funded by the Ministry of Finance. The basic planning was carried out by a project team from the beginning of 1973 to April 1974.

Aims of the Research Register

The aims of the research register are:

- to give centralized information on ongoing research at the Research Centre;
- to give advice in planning of research and in research administration;
- to compile centralized statistical information for the authorities; and
- to assist technical information service activities by acting as a link between ongoing research and the report published later.

Information Collected for the Research Register

On every research project the information is compiled in the register as follows:

- title and other information identifying the research project /1/
- scheduling information /2/
- financial information /3/
- organizational information, project leader etc. /4/
- information related to other research projects /5/
- publishing information /how the results will be published//6/
- abstract, key words and classification /7/

1/ Each project is furnished with an ID-number, title and security classification code. As to security class the research projects are either public, confidential or secret.

2/ The scheduling information tells the starting and estimated or actual finishing dates and the present position of the project. The six alternatives of present position are: "planned", "in progress", "in abeyance","abandoned", "completed", and "final report published".

3/ The financial information indicates the names of sponsors and their geographical placement in Finland. Each one's percent of financing is mentioned. The total, annual and the cumulative costs are included in the cost information.

4/ The organizational information lists the project leader, other researchers, the responsible activity unit, and the cooperating units inside and outside the Research Centre.

5/ Information on the related research projects in the Research Centre is given. Thus a later project can be referred to an earlier project, and a part project to the main project, and vice versa.

6/ The publishing information gives bibliographical details on reports published and in print. The results of public research are published in the series of the Research Centre, in technical and scientific periodicals, symposium proceedings, dissertations and patents. The results of commissioned research are confidential and are reported only to the customer.

7/ The research subject is characterized by a UDC-notation and key words. The project is also classified by using UNESCO classification by scientific fields and the OECD classification for the objectives of research. The type of research is expressed by the terms "basic research", or "applied research" or "experimental development".

The subject classification consists of 104 subject classes based on the UDC-system. Each project is given a main class number and it is also characterized by a longer UDC-notation dependent on the subject.

The researches are indexed by 1-10 English key words.

An abstract in Finnish is compiled on each research project. The Guide for Preparation of Authors' Abstracts for Publication published by UNESCO is recommended as a guide for the writing of the abstract.

Process and Reports

The Technical Information Service is the responsible unit for the research register. Information on research projects is collected for the register by a contact person in every laboratory. The data are reported on a special form when the project is being planned or as soon as it has been started.

The responsible unit analyses and prepares the researches to be registered. New projects are added and various internal reports are listed quarterly. In addition the information already registered on ongoing research is revised once a year.

A listing called the Yearbook containing the information on non-secret research projects in progress is compiled every year. The Yearbook contains a catalogue of research projects with all public information included in the register, general and statistical surveys, and indexes of responsible activity units, of main researchers and of key words. The four most important key words given appear in alphabetical order in key word index of the Yearbook.

The Yearbook is distributed to the State Administration, research institutes and industry. Special reports can be obtained on request.

Status of the Register

Information has been collected for the register on research which has been in progress since 1970. At the end of 1974 the research register contained approximately 800 projects. The annual addition has been estimated at 250 research projects.

Experiences in the Use of the Register

The Research register of the Technical Research Centre of Finland has been in use only a year and a half. So experience with the system is not extensive.

The research register can advise in planning of research and in research administration as follows:

- The register gives information about any projected research in its early stage and thus redundant researches can be avoided.
- The information in the research register facilitates the formation of project teams.
- The statistics listed at the register, show the distribution of the research activities.
- The research register has eased the compilation of the statistics demanded by the authorities.

Research information must be in one place to accomodate a customer when he inquires whether a certain subject has been studied at the Research Centre, or how and when the results of the project are intended to be published. The UDC-notation given to a project helps in classifying the published report.

Reports which are listed in a special field and distributed to industry in that field can help in the marketing of research services of the Research Centre.

Further Development

The information system of the register of research demands continuing development in collection of information, in classifications, codes, ADP system and in reporting.

It has been considered

- to make the connection of the research register more close to other governmental reporting systems;
- to add a separate classification of the areas of activity into the register;
- to develop statistical information of the Yearbook;
- to develop layout of reports;
- to translate the titles of projects into English to aid international exchange.

The research register of the Technical Research Centre of Finland has been planned, technically and organizationally, so that it could be expanded easily into a national scientific and technical register of research.

The possibilities of setting up a National Research Register are being studied by a committee appointed by the Ministry of Education. The work of the committee will be completed next year.

S.T. GROENMAN,
Netherlands Organization for the
Advancement of Pure Research /ZWO/,
The Netherlands

Session II

Part 5

Paper 19

Summary

CURRENT RESEARCH IN THE NETHERLANDS

Under this title, the Netherlands Organization for the Advancement of Pure Research /ZWO/, has, since 1964, collected and published details of research currently being conducted at Dutch universities and colleges and at government and semi-government research establishments. In principle, all fields of science are covered by this register, with the exception of the social and agricultural sciences for which separate registers exist.

The paper centers on the aims of registration as one of the means of co-ordinating research, the contents of the project descriptions, the building-up of the system to a state of almost total automation, and the possibilities for its use by research workers and government bodies.

Résumé

RECHERCHES EN COURS AUX PAYS-BAS

Sous ce titre, l'Organisation néerlandaise pour le progrès de la recherche pure /ZWO/ rassemble et publie depuis 1964 des renseignements détaillés sur les recherches en cours dans les universités et collèges universitaires des Pays-Bas ainsi que dans les établissements de recherche publics et semi-publics. Ce registre englobe, en principe, tous les domaines de la science, à l'exception des sciences sociales, et des sciences agricoles pour lesquelles existent des registres séparés.

L'auteur de l'exposé étudie surtout les objectifs de l'enregistrement, qui est l'un des moyens de coordonner les recherches, le contenu des descriptions des projets, le développement du système jusqu'à son automatisation presque totale, et ses possibilités d'utilisation par les chercheurs et les organismes publics.

CURRENT RESEARCH IN THE NETHERLANDS

S.T. GROENMAN

My intention in this paper is to restrict myself to a brief general account of a system developed in the Netherlands for the registration of current research. I shall deal in turn with the background behind the start of this activity, the aims and organization of present activities, and future prospects.

The organization responsible for these activities is ZWO, the Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek - the Netherlands Organization for the Advancement of Pure Research. ZWO is a sort of Dutch Research Council. It was established by law in 1950, and operates with funds provided by the State. In 1975 the organization's budget was a ƒ 146 million - some $ 55 million.

There are three main features of ZWO's activities:

First, they include all fields of research - that is, not only scientific research but also research in the arts and in the social sciences.

Second, ZWO promotes, coordinates and finances research by others, but does not carry out any research of its own.

Third, the research financed by ZWO is for the most part conducted at universities and colleges - the so-called second flow of money.

ZWO began with the inventorying of current research in 1964, following agreement on principles by the Board in 1961. The model chosen was the British publication, Scientific Research in British Universities and Colleges, which gives very brief details of research being carried out in Britain.

What line were the considerations which led to ZWO's inventory?

First, providing information about research before any results have been published promotes communication between research workers. Here it must be remembered not only that it often takes a long time before results are actually published in specialist's journals and reports, but also that it is some time before published work is referred to in other places, such as abstracting journals. Negative results are generally not published at all.

ZWO also wanted to get a picture of what research was being done in Holland, especially in fields and subjects for which ZWO itself was being asked to provide funds. Finally, it was felt that it would be useful for the ZWO office to have access to this kind of information when selecting advisers and the like.

The system employed by ZWO is a system of documentary information. The registration of current research in the Netherlands involves the gathering of information about the various research projects, the processing of this information, and its publication. In this way the information is made accessible to research workers and other interested parties. With a view to their use by research workers outside the Netherlands, all such publications are in English.

Let us now look at some of the various aspects of these publications in detail.

What research projects are covered?

Registration covers ongoing research at universities and similar institutions and at other government or semi-government research establishments. Besides pure research, applied research is also included, at least as far as it is connected with the field on which information is being gathered. Industrial research is not considered in view of the fact that the information provided on current research by private enterprise is too general and not informative enough.

Who do we send questionnaires to?

Information on research projects is obtained by means of questionnaires sent to the people responsible for research - that is, university professors and the directors of research establishments outside the university and college system, and to certain individual researchers not attached to a university or research establishment.

What information is asked for?

Project descriptions include the following information in the following order:

The title of the project, in bold type. If the project leads to a doctoral thesis, the word Thesis appears in brackets in the final printed form.

Next, the names of the researcher or researchers, preceded by those of any supervisors. These are followed by a definition of the problem under investigation, the aims of the project, the method used, together with a mention of any special apparatus or equipment being used, the year in which the project started, and its projected duration. This information is followed by details of any external financing, such as the names of funding bodies. Finally, a list of recent publications is given, with bibliographical details of not more than three recent publications arising from the research, and a list of any institutes, working groups or individuals with whom the researcher is collaborating.

The survey is carried out on a voluntary basis and along normal administrative lines, with reminders and so on. Response is excellent, at around eighty percent.

Data processing

Right from the start it has been the aim to automate the processing of information obtained by means of the questionnaires. The necessary programs have been developed by IWIS-TNO, the TNO Institute for Mathematics, Information Processing and Statistics, The Hague.

The details of every project description are entered on punched tape with a flexowriter. The choice of eight-hole paper tape, which can record 128 different symbols, makes it possible to distinguish between capitals and lower-case letters. Apart from various special symbols there are also signs and combinations of signs indicating typographic details, such as bold-face type, italics, and the alternative divisions of a word.

The punched tape data are read and checked by the central TNO computer, a CDC Cyber 72, which stores them in a data base.

When the data base contains all the information from the questionnaires, the data, together with typographic instructions, are transferred to an electronic phototypesetting machine at the Netherlands State Printing House. For this purpose they are put on punched or magnetic tape in the form of photocomposition instructions, comprising the completed text with the various different registers containing typographic instructions relating to body size, font, and other information required for the composition of complete pages.

The phototypesetting machine produces composed text on film at actual size. This is then reproduced by a photographic offset process. The final result is scarcely distinguishable in quality from conventional printing produced with lead types.

The desired lay-out has to be fed into the computer at the outset, and is a balanced combination of various factors: on the one hand tries to achieve maximum legibility and usability, on the other hand there are demands and limitations imposed by the process and the costs involved. The lay-out has been designed by G.M. POT-van REGTEREN ALTENA, Schoorl, The Netherlands. Fig 1. shows a page from the most recent publication with the end of one section and the beginning of the next, at the top of the following column. The fact that each new section begins with a new column and does not follow on from the previous one is the result of a compromise to assist in the automation. If a section has to be re-set for any reason it would otherwise be impossible for the computer to refind the right place on the page. At the same time, it allows to compensate for any overrunning.

The publication

In order to offer research workers in a particular field information on what is going on in related fields, ZWO's publications are presented in three volumes: covering current research in the physical sciences, the life sciences and the humanities. In this division into three separate volumes, certain branches of science, such as biophysics and palaeontology, are included in more than one volume.

The first volume comprises the physical sciences: mathematics, physics, astronomy, geology and - though these branches have not yet been surveyed - chemistry and technology. The second volume covers the biological and medical sciences: biology, medicine, dentistry, pharmacy, veterinary sciences and agriculture, while the third volume embraces the humanities: philosophy, theology, history, art history, archaeology, linguistics and literature. For the field of the social sciences, researchers are referred to the registers produced by the Social Science Information and Documentation Centre of the Royal Netherlands Academy of Arts and Sciences, Amsterdam.

Other activities in the field of project registration include work by the Dutch National Council for Agricultural Research TNO, The Hague, and, in the field of environmental research, work by the SCMB-TNO, the Study and Information Centre TNO on Environmental Research, Delft, The Netherlands.

For the classification of research projects for the main text, which goes by subject, a new system had to be devised. The model chosen was that of the abstracting journals for the various branches of science, because it was felt that their classification system would be the easiest one for researchers to use. This applies both in the questionnaires, where researchers are asked to classify their own projects, and in the usage of the finished publication itself. To ease the compilation of alphabetical indexes, researchers are also asked to supply key words.

Each publication provides the answers to four questions: What specific research is being done, where and by whom? What research - that is, the general field and the specific subject - is being done at a given institute or department? Who does what where? And in which field is a specific subject listed and where and by whom is research on that subject being done?

To begin with, the information for each project was limited to the project title and the names of the research workers. Since the system was expanded to include all the information which I have already described, our data bases have been built up again from scratch, and we now have complete sections on the humanities and the biological and medical sciences, while we are at present building up a data base on the physical sciences from information now being received from our current survey. In all, we have data on 5200 projects being conducted by 7100 researchers at 650 institutes, departments and laboratories. Of these, 1600 projects are in the humanities, with 1700 researchers at 200 institutes, and 3600 projects in the field of the biological and medical sciences, with 5500 researchers at 450 institutes and laboratories.

Publication takes place when the data from the relevant surveys have been processed. The data base is constructed in such a way that it is not only possible to take the text of the publication from it, but there is also the possibility of retrieval, Additions and alterations to the data are possible at any time for updating the information stored. The selection of certain desired projects can be effected by inserting questions into the system, possibly directly, via a terminal, and hence interactively. ZWO, however,has not yet made use of this retrieval option, unlike the Study and Information Centre on Environmental Research, which also uses this system. Making available information on the nature and extent of research is a primary condition for the operation of research and science policy, and it is for this reason that the need for information on ongoing research is increasing steadily at various levels.

The registration of projects can be of assistance to research workers by helping them to co-ordinate their work: duplication of effort, at least as far as it arises from a lack of awareness of what other people are doing,can thus be avoided. In a research policy this can promote the best possible co-operation throughout the country and thus improve the efficiency of research as a whole.

As regards future prospects, the system can be expanded or adapted whenever necessary. Looking in another direction, international collaboration would appear to offer good prospects, especially if we start with the smaller fields of science and go about it the right way. Agreement on the classification system /perhaps UNISIST would be the answer here/ and the thesauri to be used would be indispensable for access to data bases.

Publications in the series Current Research in the Netherlands

Physics 1965. The Hague 1965, 66 p.

Biology 1966. The Hague 1966, 161 p.

Language and Literature 1967. The Hague 1967, 100 p.

Mathematics, Physics, Astronomy 1968. The Hague 1968, 146 p.

Biological and Medical Sciences 1968. The Hague 1969, 691 p.

Humanities 1969. The Hague 1970, 280 p.

Mathematics, Physics, Geology, Astronomy 1970. The Hague 1972, 168 p.

Humanities 1971. The Hague 1973, 301 p.

Biological and Medical Sciences 1973. The Hague 1975, 644 p.

REFERENCES

1. GROENMAN, S.T. A register of scientific research in the Netherlands. Nature. 208, 1965, p. 28-29.
2. Idem, Inventarisatie van het wetenschappelijk onderzoek in Nederland. Universiteit en Hogeschool. 12, 1965/66, p. 354-357, 414.
3. Idem, ZWO en de inventarisatie van lopend wetenschappelijk onderzoek. ZWO-Jaarboek. 1970, [1971], p. 122-126.
4. BAKKER, H., de HEER, T. and HOFSTEDE, N.J.C.M. Computer en boekdrukkunst. TNO-Nieuws. 27, 1972, p. 775-778.
5. BAKKER, H. Programmapakket voor inventarisatie van projecten in EUSIDIC-MARC 2. The Hague, IWIS-TNO, 1975, p. 10 + 12.

WFp Wageningen, Vakgroep Fytopathologie

Nutrition of mycorrhizal fungi of the genus Lactarius in pure culture
Oort, Prof.Dr.A.J.P.
Aim: to investigate the nutritional pattern of Lactarius species. Results can contribute to answer questions regarding the relation between tree species and the nutrition of the fungus partner and the relation between nutritional pattern and taxonomic groups within the genus. Insight can be gained into the utilization of complex carbon and nitrogen compounds in the litter
Growth experiments on semiliquid medium. Field and radial growth are determined
Started 1969, duration ca. 7 years; grants BION, Olde van Vlotenfonds

WNN Wageningen, Vakgroep Natuurbehoud en Natuurbeheer

Studies on the vegetation and soils of the Sipaliwini-savanna area in Surinam
Florschütz, Dr.P.A. (Institute *USP*)
Stoffers, Prof.Dr.A.L. (Idem)
Zonneveld, Prof.Dr.I.S. (Geografisch Instituut, Rijksuniversiteit Utrecht)
Oldenburger, Drs.F.H.F.
Riezebos, Drs.H.Th. (Geografisch Instituut, Rijksuniversiteit Utrecht)
Norde, R.
Reconstruction of origin and presence of the Sipaliwini-savanna ecosystem amidst the surrounding tropical rain forest belt
Inventarization of the flora. Taxonomic and plant-geographical studies with help of the literature. Vegetation study and classification as well by the phytosociological method of Braun-Blanquet (French-Swiss School) as also based on a 'formation' principle, by which in combination with pedological research and classification of the soil types an ecological characterization of the area will be deduced
Started 1968, duration ca. 6 years
Other details: Research in collaboration with the Instituut voor Bodemkunde, Rijksuniversiteit Utrecht and the Afdeling Biologie, Botanisch Laboratorium, Katholieke Universiteit Nijmegen (NBi)

WTP Wageningen, Vakgroep Tropische Plantenteelt

Anatomical and morphological development of the groundnut, Arachis hypogaea
Staritsky, Dr.G.
The relation of the microscopic morphology of the groundnutplant and its environment
Plant growth chambers, microscopic methods
Started 1973, duration ca. 8 years
Publ.: G. Staritsky, Morphogenesis of some tropical Leguminous crops, CELOS Bull. 13, 1971, pp. 9-10/Id., Seed morphology and early development of the groundnut (Arachis hypogaea L.), Acta Bot. Neerl. 22, 1973, pp. 373-389

Systems of agriculture in Ethiopia. Useful plants in Ethiopia: pulses and oil crops
Ferwerda, Prof.Dr.Ir.J.D.
Wit, Prof.Dr.H.C.D.de (Institute *WPsy*)
Westphal, Ir.E.
Seegeler, Ir.C.J.P.
The project aims at a survey of useful plants in Ethiopia and the systems of agriculture in which these crops take part. The ultimate goal is to contribute to the knowledge of these useful plants in order to promote improvements in Ethiopian agriculture
Collecting wild and cultivated taxa (dried/conserved on spirit), in particular seed samples at market places, as well as data on ecology, distribution and husbandry (in Ethiopia). Taxonomic treatment of the collected material. Treatment of the data concerning ecology, distribution and husbandry, possibly supplemented by experiments to study more closely the development of the crops (at Wageningen)
Duration 1967-1977; grant NUFFIC
Publ.: E. Westphal, Ethiopische voedingsgewassen: een inventariserend onderzoek, Landbouwk. Tijdschr. 83, 1971, pp. 188-191/Id., De Ethiopische landbouw, Oost en West 64, 1972, pp. 7-11
Other details: Research in collaboration with the College of Agriculture, Haile Selassie I University, Dire Dawa, Ethiopia

ZZZ Non-institutional research

Cyclopaedia of Botanical Exploration in Malesia: Malesian plant collectors and collections, Suppl. 2
Steenis-Kruseman, Mrs.M.J.van
Survey of plant collectors and plant collections made in Malesia, in the period 1958-1972, with data on brief itinerary, size of collections, literature on these collections, and brief biographical data
Duration 1958-1973
Other details: Research in collaboration with the Rijksherbarium, Leiden (LRh)

21 Palaeobotany (Phylogeny)

Including Palynology, Pollen analysis

AHV Amsterdam, Hugo de Vries-Laboratorium

Interpretative and phylogenetic floral morphology (Angiosperms)
Meeuse, Prof.Dr.A.D.J.
For details, see under heading *20 AHV*

AHVVP Amsterdam, Hugo de Vries-Laboratorium

Vegetation and vegetational history of the Molenven (Overijssel, the Netherlands)
Donselaar, Dr.J.van
Hammen, Dr.Th.van der
Smit, Drs.A.
Wijmstra, Dr.T.A. (with students)
The reconstruction of vegetational succession of the near past and the present, and the relation between succession and climatic variations
Vegetation records (relevees), sample plats, false colour techniques, interpretation of aerial photographs, pollen diagrams (with 1 mm sample distance), hydrological research (with registration of ground water table)
Started 1969
Other details: Research in collaboration with the Afdeling Hydrologie of the Instituut voor Aardwetenschappen, Vrije Universiteit Amsterdam (AVUAa)

Palynological study of raised peat bogs in the Eastern Netherlands and adjacent Germany, in particular the analysis of fungal remains
Hammen, Dr.Th.van der
Geel, Drs.B.van
Aim: to obtain novel data concerning the holocene vegetational and climatic history
By means of a microscopic analysis the samples are examined for the presence of pollen grains and the spores of mosses and ferns, and also of other microfossils with a characteristic form such as spores and other fossilised remains of Fungi. Successive 1 cm samples of some peat sections are analysed. In some special parts of the sections successive 1 mm samples are analysed. Every sample is examined with regard to its degree of humification and the macroscopic remains of the local fossil plants
Started 1972, duration ca. 3 years; grant Z.W.O.
Publ.: T.A. Wijmstra, A. Smit, Th. van der Hammen & B. van Geel, Vegetational succession, fungi spores and short-term cycles in pollen diagrams from the Wietmarscher Moor, Acta Bot. Neerl. 20, 1971, pp. 401-410/B. van Geel, Palynology of a section from the raised peat bog 'Wietmarscher Moor' with special reference to fungal remains, Acta Bot. Neerl. 21, 1972, pp. 261-284

Quaternary geology and palynology of Colombia
Hammen, Dr.Th.van der
Hulshof, Drs.O.K.
Grabant, Mrs.R.A.P.
Schreeve-Brinkman, Mrs.Drs.E.J.
Cleef, Drs.A.M.
An extensive reconstruction of the history of the Quaternary in Colombia
Chiefly interdisciplinary research, with special emphasis on palynology
Started 1968; grant WOTRO
Other details: Research in collaboration with the Instituut voor Prae- en Protohistorie (AIPP), the Laboratorium voor Fysische Geografie en Bodemkunde, Universiteit van Amsterdam, the Instituto Nacional de Investigaciones Geologica-Mineras, the Instituto Columbiano de Antropologia, and the Instituto de Sciencias Naturales, Bogota, Colombia

Vegetation and climate history of the pleniglacial of the Netherlands

DISCUSSION, Session II, Part 5.

Moderator: A. NEELAMEGHAN,
Documentation Research and
Training Centre
India

Discussion of the paper by D. SENE

A. ROMDHANE: M. SENE a cité la chiffre de 2000 dollars. Est-ce que ceci correspond aux frais d'exploitation du système sur l'ordinateur et si c'est le cas, à combien d'heures machine correspond-il?

D. SENE: Ces 2000 dollars correspondent effectivement aux frais de traitement sur ordinateur, ce qui représente au maximum 10 heures par an, le temps nécessaire pour l'analyse du potentiel. Ce qui nous coûte plus ce sont toutes les phases intermédiaires précédant l'analyse: les enquêtes individuelles et tous les tris intermédiaires.Il faut compter en moyenne,par chercheur,un jour de travail complet pour un cadre du niveau technicien supérieur. Il ne faut pas oublier non plus la rédaction des rapports par la suite, qui est assez coûteuse.

H. ARNTZ: Au début de l'année dernière à Dakar, lors de CASTAFRICA, la Conférence pour l'application de la science et de la technologie au développement africain, nous avons largement discuté des problèmes de la recherche en cours. Comment jugez-vous l'influence permanente de la conférence? Est-ce qu'elle a établi des liens durables avec d'autres pays d'Afrique?

D. SENE: Tout est une question d'organisation. La Conférence CASTAFRICA a jeté des idées généreuses et très nobles, seulement ce qui est plus difficile c'est de les mettre en pratique, d'abord au niveau des pays eux-mêmes. Car, il ne faut pas ignorer que la Conférence CASTAFRICA a révélé aussi que c'est peut-être l'Afrique qui est l'un des continents les moins bien organisés en ce qui concerne les instances de politique scientifique. Donc la première étape actuellement franchie, depuis CASTAFRICA, ou qui va l'être, était de mettre en place, au niveau de chacun des pays, des structures nationales pour l'élaboration de la politique scientifique. La deuxième étape de coopération entre les différents pays va suivre et sera plus facile. En ce qui concerne l'Afrique de l'Ouest, des contrats sont déjà pris pour mieux organiser cette coopération, étant donné que maintenant beaucoup de pays de cette partie de l'Afrique ont des structures nationales de politique scientifique et technologique. Nous pensons que 1976 verra des réunions sur les problèmes de coopération de façon très concrète sur les programmes en fonction des priorités définies par les différents états.

M. MORIN: Je voudrais vous poser une question qui découle directement du nombre d'heures machine par an que vous avez indiqué. Quel est le nombre de projets recensé par votre deuxieme enquête qui vient d'être terminée?

D. SENE: Ça dépend de ce qu'on entend par projet. Nous pouvons considérer qu'en ce qui concerne les thèmes, nous sommes en gros, à peu pres, à mille thèmes de recherche. Je dois vous signaler aussi que nous avons changé d'ordinateur et nous utilisons depuis quelques mois un IBM 370 145 avec lequel nous avons quelques problème à passer le logiciel Osiris. Nous sommes donc en train de négocier avec l'UNESCO et Michigan l'acquisition de la dernière version d'Osiris afin de pouvoir résoudre cette difficulté. J'ai fait une petite digression sur Osiris parce que je crois que c'est très important.

Discussion of the paper by T. IWASAKI

E. DE GROLIER: You mentioned a classification for science, medicine and agriculture but if my information is correct, the Information Centre for Science and Technology is part of the Science Council of Japan which includes also social sciences and humanities. What about the research projects in these fields, i.e. social sciences and humanities, are they covered by your centre or by another centre?

T. IWASAKI: We are concerned with science and technology. Social sciences projects are collected by Hitotsubashi University and Kobe University. Does this answer your question?

T. YOSIMURA: I would like to tell you about the Japan Science Foundation experience in that area, since I will not have the chance to present my paper. JSF has two computerized information systems on ongoing research in Japan. One is RECRAS and the other is REGISTER. Both are based on a similar idea, i.e. man-machine cooparating system. A multi-aspect coordinating decimal classification machine with four digits is used to form the data base for retrieving and to make searching formula. Usually a classification scheme and/or key words have been adopted in information retrieval. We think, however, based on our experiences, that for ongoing research projects, a classification scheme using facets is more effective than key words. Recruitment of capable retrieval officers and indexers is the crux of the problem at the present and in the future.

Discussion of the paper by K. TIRRONEN

K. FIALKOWSKI: You have mentioned that your information system is classified. Who has full access to the information?

K. TIRRONEN: Information on secret projects could only be known by the project leader and research director.

V. DE SILVA: When a project is finished and if results were released from time to time, do you maintain this interim information in order to disseminate it consequently?

K. TIRRONEN: Results are published elsewhere, we just enter the abstract of the project in our register.

A. BEIHAGHI: You mentioned that there are about 800 research projects in the register - does this include all the research done in the universities and the ministries or only in your technical research centre?

K. TIRRONEN: No, we register only research projects carried out at the Technical Research Center of Finland.

A. BEIHAGHI: The other projects, are they registered elsewhere?

K. TIRRONEN: Some are, but we do not have a national register yet.

D. HERSEY: I would just like to try to clarify the system you have reported on. This was a system which we included because it represented the development of an ongoing research information system for a single organization, in a national environment, in one country. To go back and try to answer the question that was raised a little earlier concerning the classified documents, these documents are intended for the management within the agency and are not available for outside use. The system presented has a dual purpose, one to provide information to others and the other to provide information internally, for the operation of the national system itself. The other question raised to Mrs. TIRRONEN was: does the organization keep the information on the technical reports that might come out of a current research project?

I think the answer, based upon what was in your paper, is: that it does not, at least, at this point in time.

H. ARNTZ: Under further development, Madam, you mentioned a specialized classification of activities to be inserted into the register. Is this a classification which has to be invented or is this an extract of an existing ordering system? what is meant by the specialized classification?

K. TIRRONEN: This classification is in use at the Statistical Centre of Finland.

Discussion of the paper by S. GROENMAN

J.E. BROWN: I may have missed a point - do you collect fiscal data on each project? Another question - In my experience, particularly in the departments of the government concerned with science, the costs of research projects are usually buried in the total budget of the department. Have you had any problems in collecting the fiscal data from the government departments?

S. GROENMAN: We don't collect data on the costs of the projects otherwise we might have the same problems.

M. EL HADI: My question concerns the data input. Is it on a voluntary basis or on a contractual basis or on another sort of centralized system?

S. GROENMAN: Collection is on a voluntary basis.

H. HEINRICH: You said that you store capital letters as well as small letters. Have you any problems with the computer when you look for special titles, because a word can start with a capital letter or a small letter.

S. GROENMAN: Yes, I told you before that we don't handle the retrieval ourselves, but I heard that there were problems with the computer, they had to make a special file to settle these problems.

V. VINCENT: Je voudrais savoir si vous révisez les mots clefs qui sont fournis par les chercheurs, et si non, comment assurez-vous l'homogénéité entre les divers types de mots clefs.

S. GROENMAN: Well, the key words are not homogenous, in fact we accept them as they are presented to us.

Mr. RAMPACHER: You told us that the collection is voluntary. Can you estimate what percentage of all the projects ongoing in Holland you have covered?

S. GROENMAN: We must make a difference between the university system and the research establishments. In the latter the percentage covered is around 90% and in the former I think it is around 80%. I must add that we are not sure that the people are mentioning all their projects, we have no control on that.

G. DESROCHES: Je voudrais savoir quels sont les rapports entre le ZWO et le TNO et plus précisément si ZWO publie toutes les informations sur toutes les recherches que fait le TNO ou qu'il prévoit de faire?

S. GROENMAN: Well, there is not much cooperation between ZWO and TNO. ZWO is the Research Council and does not carry out research itself. TNO is an organization for the applied scientific research and has its own laboratories, computer centre, statistics department, a centre for environmental research, etc.

We send out questionnaires also to the TNO establishment and they answer on a voluntary basis. Some of these establishments like other departments are not willing to answer.

G. FOSSI: You have given us good news by telling us that the response of the researchers is 80% or 90%, usually we hear differently. There is great difficulty in getting researchers to respond to such questionnaires - Could you tell us if you have special motivation or is it the character of Dutch colleagues to whom this discipline and good cooperation is to be attributed?

S. GROENMAN: There might be a very simple explanation. People sometimes get money from our organization and therefore they have some interest in giving us the information. On the other hand, we do not ask for financial data which might make them unwilling to answer.

E. SAMAHA,
Director,
Scientific Documentation and
Information Center,
National Council for Scientific
Research,
Lebanon

Session II

Part 6

Paper 20

Summary

THE PREPARATION OF A DIRECTORY OF ONGOING RESEARCH IN LEBANON

The preparation of a directory of ongoing research in Lebanon was one of the main projects carried out by the Scientific Documentation and Information Center recently created by the National Council for Scientific Research. Partial information was available through annual reports and abstracts of scientific meetings but a global source was lacking.

To collect the information needed a form was sent to all investigators working in Lebanon, in science, medicine and technology. Social sciences were excluded in this first stage. Instead of a summary describing the project, researchers were asked to state briefly and separately the objective and the approach of their project. They were also invited to provide a few words on the progress of their research or, eventually, on results. This was thought to be easier to complete and to allow for more homogeneous answers, particularly since no such local directory was available for use as a model. The possibility of replying in English or French was offered. To overcome the shortage of indexing specialists, researchers were asked to supply up to six terms to be used for subject indexing.

Several months after starting the project, interviews were conducted with a representative sample of the investigators to determine whether they had used or heard of national or international sources of ongoing research; to find out whether they feel a need for such information and whether they would be willing to contribute annually to it; and to determine how they would prefer that the information be made available to them.

The results of these interviews are presented, and a critical analysis of the form and procedure is made. Difficulties encountered are mentioned, and suggestions for the improvement of the form and the collection of information are made. The computerizing of this directory is also considered. International exchange of information serves as a background for the discussion of this project.

Résumé

L'ELABORATION D'UN REPERTOIRE DES RECHERCHES EN COURS AU LIBAN

L'élaboration d'un répertoire des recherches en cours au Liban a été l'un des principaux projets réalisés par le Centre de documentation et d'information scientifique récemment créé par le Conseil national de la recherche scientifique. On pouvait disposer auparavant de renseignements partiels en consultant les rapports annuels et les résumés analytiques de réunions scientifiques, mai il n'existait pas de source globale d'information.

Pour recueillir les données nécessaires, on a adressé un formulaire à tous les chercheurs travaillant au Liban dans les domaines de la science, de la médecine et de la technologie. A ce premier stade, les sciences sociales étaient exclues. Au lieu d'un résumé descriptif du projet, on a demandé aux chercheurs d'indiquer brièvement et séparément l'objectif et le mode d'approche de leur projet. Ils ont également été invités à préciser en quelques mots l'état d'avancement de leurs travaux et, éventuellement, les résultats obtenus. On avait pensé que ce formulaire serait relativement plus facile à remplir et permettrait d'obtenir des réponses assez homogènes, d'autant qu'il n'existait aucun répertoire local pouvant servir de modèle. Les chercheurs avaient la possibilité de répondre en français ou en anglais. Tenant compte de la pénurie de spécialistes de l'indexation, on avait demandé aux chercheurs de fournir jusqu'à six termes pour l'indexation par matières.

Plusieurs mois après la mise en route du projet, on a organisé des entretiens avec un échantillon représentatif de chercheurs pour savoir s'ils avaient eu recours à des sources nationales ou internationales d'information sur les recherches en cours ou en connaissaient l'existence, s'ils ressentaient le besoin d'obtenir ce genre d'informations et étaient prêts à en fournir eux-mêmes chaque année, et sous quelle forme ils désiraient que ces données soient mises à leur disposition.

Les résultats de ces entretiens sont indiqués dans l'exposé qui contient aussi une analyse critique du formulaire et des méthodes employés. L'auteur évoque les difficultés rencontrées et suggère des moyens d'améliorer le formulaire et le mode de rassemblement des informations. Il étudie également la mise sur ordinateur des données du répertoire. Tout l'examen du projet est replacé dans le contexte de l'échange international d'informations.

L'ÉLABORATION D'UN RÉPERTOIRE DES RECHERCHES EN COURS AU LIBAN

E. SAMAHA

1. Introduction

La nécessité d'une information sur les recherches en cours est de plus en plus ressentie, non seulement par les responsables de la politique scientifique,mais aussi par tous ceux qui sont préoccupés par l'information scientifique. Sa particularité est qu'elle ouvre la voie aux scientifiques pour communiquer entre eux au moment le plus propice de leur activité, c'est-à-dire, au moment où ils ont le plus besoin de l'échange d'information ou d'idées.

Le délai important qui existe entre l'obtention d'un résultat scientifique et sa publication ne cesse d'augmenter réduisant pour autant l'exploitation de ce résultat. De plus en plus, ce sont les réunions scientifiques, les visites et les contacts personnels qui deviennent les moyens les plus efficaces et les plus rapides de l'information scientifique.

C'est pourquoi, le Centre de Documentation et d'Information Scientifiques du Conseil National de la Recherche Scientifique du Liban n'a pas hésité à entreprendre, dès sa création, la préparation d'un répertoire national des projets de recherche en cours.

Nous allons exposer et analyser la méthode que nous avons suivie en signalant les difficultés rencontrées et les erreurs commises ainsi que les solutions envisagées. Nous allons également communiquer les résultats d'une enquête que nous avons entreprise auprès d'un échantillon représentatif des chercheurs en vue de connaître de plus près leur avis et produire un répertoire répondant au mieux à leurs besoins. Enfin nous signalerons les actions que nous envisageons d'entreprendre en vue de développer notre système et proposerons notre vision de l'échange international dans ce domaine.

2. Sources actuelles d'information sur les recherches en cours

Les sources partielles actuelles d'information sur les recherches en cours au Liban sont les rapports annuels de recherche et les résumés des communications aux réunions scientifiques. Nous allons passer en revue les plus importantes.

- L'Université Américaine de Beyrouth publie depuis 1959/60 un rapport annuel en anglais sur les recherches effectuées dans les divers départements de cette université. Les recherches, classées par départements, y sont décrites par un bref résumé.

- Le Conseil National de la Recherche Scientifique publie depuis 1973 son rapport annuel où sont décrits les projets de recherche subventionnés par lui. L'information est suffisamment descriptive et fournit comme détails supplémentaires: la date de début du projet et le montant de la subvention. Ce rapport paraît en trois éditions: arabe, française et anglaise. Il peut être obtenu gratuitement sur demande.

- Le Département de physique de la Faculté des Sciences de l'Université Libanaise vient de publier un fascicule sur les recherches accomplies et en cours dans ce département. Il est probable que les autres départements suivront cet exemple.

- L'Association Libanaise pour l'Avancement des Sciences organise depuis 1969 une réunion scientifique annuelle au cours de laquelle les participants exposent les résultats les plus récents de leurs recherches, souvent avant publication. Les résumés des communications sont publiés en un seul volume qui peut-être considéré comme une source d'information sur les recherches en cours les plus avancées ou récemment terminées. Depuis 1971, les chercheurs arabes sont invités à participer à cette réunion, ce qui élargit le domaine géographique couvert par cette information. Le Conseil National de la Recherche Scientifique supporte cette réunion depuis 1972 et plus particulièrement l'impression et la diffusion des résumés.

Les autres rapports de recherche émanant d'autres institutions son plutôt confidentiels et ont une diffusion très restreinte pour être cités.

Quoique intéressantes et informatives, ces sources restent cependant incomplètes et non standardisées. Certains rapports paraissent en retard d'un an et même plus. A part quelques index-auteurs, il n'y a aucun traitement de l'information et aucun index par sujet n'est disponible. En outre, seul le rapport du CNRS est diffusé largement, les autres ont une diffusion restreinte.

3. Répertoire national

Le plan du Centre de Documentation et d'Information Scientifiques du CNRS, élaboré en 1973, prévoyait ce répertoire parmi les priorités de son programme d'activités. Etant donné l'absence de modèle et de tradition dans ce domaine, la préparation pour la première fois d'un tel répertoire ne va pas sans difficultés. L'absence de directives à l'époque[1] et le peu d'information disponible à ce sujet ont été bien ressentis. Néanmoins, nous n'avons pas hésité à lancer le projet en juillet 1974, avec l'idée que l'expérience qui sera acquise nous aidera à l'améliorer en cours de route. Nous devons préciser, cependant, que le répertoire publié par la FAO dans le cadre du projet CARIS et une notice de la SSIE nous ont servi de modèles.

Les recherches en sciences humaines seront excluses dans une première phase.

4. Le questionnaire

Un questionnaire a été mis au point et rédigé en français et en anglais Il comprenait les éléments suivants:

a - Titre du projet

b - Noms des chercheurs principaux et des chercheurs-adjoints avec leurs spécialités respectives

c - Institution dans laquelle le projet est entrepris

d - Date de début du projet

e - Institution qui finance le projet

f - Objectif du projet

g - Approche

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[1] Les principes directeurs de l'UNISIST nous sont parvenus en Août 1975.

h - Avancement de la recherche ou résultats

i - Termes d'indexage

Au lieu d'un résumé descriptif nous avons préféré demander aux chercheurs de répondre séparément aux questions /f, g et h/ pensant que la description ainsi fournie sera plus systématique et plus uniforme et surtout plus facile à rédiger par les chercheurs.

En outre, afin de palier au manque de personnel spécialisé pour indexer correctement les projets, nous avons demandé au chercheur lui-même de fournir 6 termes au maximum pouvant servir à l'indexage par sujet. En fait, cette méthode nous paraissait à priori plus logique car nous pensons que le meilleur indexeur d'un texte est son auteur.

Le problème de langue ne pouvait pas être négligé, la situation multilingue particulière de notre pays nous a amené à offrir aux chercheurs la possibilité de répondre en français ou en anglais.

5. Collecte de l'information

La collecte de l'information est sans doute l'opération la plus délicate et la plus difficile. Plusieurs approches sont possibles et leur choix dépend de la situation particulière de chaque pays. Les principes suivants ont guidé notre choix:

- La participation directe des chercheurs à ce répertoire est indispensable. En effet, tout système d'information s'adressant aux chercheurs ne peut se développer que s'il obtient l'adhésion de ceux-ci et les incite à y contribuer.

- Pour un premier répertoire, la publication et la diffusion d'information sur les recherches en cours ne doivent pas se faire à partir des données disponibles sans obtenir l'accord des chercheurs.

Notre méthode de collecte a exclu donc le recours aux registres des institutions pour reproduire leur information d'autant plus que cette information était incomplète. La consultation de ces registres sera bien sûr utile pour recenser les projets en vue de vérifier la couverture du répertoire. En cas de lacunes, les chercheurs seront contactés pour obtenir leur information.

Nous avons tenu au recours à la collecte directe des données auprès des chercheurs, la méthode la moins réaliste peut-être, mais que nous considérons plus efficace à long terme et plus mobilisatrice.

C'est ainsi, qu'en juillet 1974, nous avons distribué le questionnaire accompagné d'une lettre circulaire soit directement aux chercheurs soit par l'intermédiaire des doyens ou des chefs de départements. Des contacts personnels ont été faits chaque fois que c'était possible.

Une distribution de rappel a été faite en avril 1975 et en même temps une enquête était entreprise auprès des chercheurs à ce sujet.

6. Enquête sur le répertoire

L'enquête a été menée auprès d'un échantillon représentatif de 45 chercheurs. Nous espérions pouvoir consulter 100 chercheurs, mais les circonstances particulières traversées par notre pays nous ont obligés à nous limiter a ce nombre. Cette enquête que j'ai menée moi-même au moyen d'un interview-questionnaire avait pour but:

- de savoir si les chercheurs sentent le besoin pour une information sur les recherches en cours et s'ils sont prêts à contribuer;

- d'évaluer le questionnaire;
- de voir comment ils souhaiteraient avoir cette information à leur disposition.

L'échantillon était constitué de 36 Libanais, 4 Français, 3 Américians et 2 Jordaniens se répartissant ainsi dans les institutions:

- Université Américaine de Beyrouth: 29 /14 en médecine, 11 en agriculture, 1 en génie, 1 en géologie, 1 en pharmacie et 1 en santé publique/
- Faculté des Sciences de l'Université Libanaise: 6
- Conseil National de la Recherche Scientifique: 4
- Centre d'Etudes Mathématiques: 2
- Faculté Française de Médecine et de Pharmacie: 2
- Institut de Recherches Agronomiques: 2

Leurs diplômes suivant les pays d'origine étaient:

37 doctorats dont 22 des Etats-Unis
9 de France
3 d'Angleterre
1 d'Allemagne
1 de Canada
1 de Suisse

5 M.D.

2 M.D. avec M.S.

1 Ingénieur avec D.E.A.

41 sont postérieurs à 1957 et 27 postérieurs à 1963.

7. Résultats de la collecte et de l'enquête

Nous ne nous attendions pas à un empressement des chercheurs pour répondre au premier questionnaire mais le nombre de questionnaires renvoyés dûment remplis à la suite de notre première distribution n'a pas été encourageant. Ce manque de contribution et de coopération serait principalement dû aux raisons suivantes:

- L'inertie habituelle, plus apparente dans un pays en voie de développement.
- Des perturbations dans la vie universitaire à la suite de grèves prolongées ayant occasionné une surcharge pour les professeurs et des soucis supplémentaires.
- Le mois de juillet choisi pour distribuer le questionnaire /date imposée par les circonstances de notre travail/ s'est avéré peu approprié. Certains chercheurs étaient déjà partis en vacances ou sur le point de partir, d'autres étaient absorbés par les examens. De plus la distribution du questionnaire effectuée par les doyens et les chefs de départements était difficilement contrôlable à cette époque; des lacunes et des oublis ont été constatés bien plus tard et il a fallu les combler directement.
- Les chercheurs, surchargés peut-être par l'enseignement et la recherche, n'on pas accepté de bon coeur un questionnaire de plus à

remplir ou plutôt ne se sont pas empressés à le remplir. L'initiative de notre Centre a dû leur paraître un peu singulière. Ainsi l'enquête a montré que la presque totalité des chercheurs interrogés n'avaient non seulement pas utilisé un système d'information sur les recherches en cours mais n'en avaient jamais entendu parler, à part, bien sûr, des rapports de leurs institutions. Un seul était vaguement au courant de la SSIE pour avoir rempli une notice d'un projet financé par une Agence Internationale. Pourtant, tous les chercheurs interrogés ont été formés à l'étranger. 20 ont fait un post-doctorat dont 18 aux Etats-Unis. 31 on fait un séjour dans un pays développé pour faire de la recherche et de l'enseignement dont 22 séjours après 1969; 19 aux Etats-Unis, 6 en France, 2 en Allemagne, 2 en Suisse et 1 aux Pays-Bas. Ceci n'empêche que le besoin pour une telle information a bien été perçu comme nous le verrons plus loin.

- Le remplissage du questionnaire n'a été aussi facile que nous le pensions. Certains éléments du questionnaire qui nous paraissaient évidents, ne l'étaient pas pour tous. Ainsi, l'enquête a montré que 32% ont trouvé le mot "approche" assez vague tandis que 9% ont accroché la question "termes d'indexage". Nous avons commis l'erreur de ne pas faire accompagner le questionnaire d'un texte explicatif; celui-ci nous semblait trivial. Mais nous avons palié à cette lacune en fournissant les explications soit au cours des réunions de professeurs de certains départements soit directement aux chercheurs contactés.

Cependant, les réponses à nos contacts directs et à notre rappel ont été bien plus encourageantes. Le succès aurait été total s'il n'y a pas eu depuis avril 1975 des troubles internes graves dans le pays qui ont fortement perturbé sinon empêché nos communications avec les chercheurs.

D'autre part, en vue de recenser les projets, nous avons entrepris la collecte des données disponibles dans les diverses institutions de recherche dans le pays. La coopération des responsables de ces institutions était totale mais leurs registres étaient encore largement incomplets à la date du 10 septembre 1975. En tout, environ 400 projets ont été recensés.

Nous espérons que les fascicules des sciences agricoles et des sciences médicales prévus pour la fin de l'année auront une couverture presque totale.

8. Remarques sur les questionnaires remplis

Dans l'ensemble le résultat est satisfaisant. 60% des réponses étaient bien rédigées et présentées, les autres présentaient des omissions ou des imprécisions et des contacts étaient nécessaires pour les compléter et les retoucher.

La description des projets a posé des problèmes, peut-être parce que les chercheurs n'avaient pas de modèles qui illustrent ce qu'on demandait d'eux, ou aussi par réticence. En effet, l'enquête a révélé que 10% souhaitait ne pas répondre aux questions: f, g et h pour ne pas dévoiler leurs projets. Ils considèrent que certains projets ne peuvent pas être divulgués, les idées exprimées pourraient être reprises par des chercheurs étrangers mieux équipés. Des exemples sur les pirates d'idées ne semblent pas manquer. Cette inquiétude des chercheurs s'est réflétée chez quelques uns de ceux qui ont répondu par une description des projets peu spécifique et un peu vague. Notre souci d'obtenir l'accord des chercheurs pour publier une information sur leurs recherches courantes était donc justifiée.

Cette question mise à part, notre choix des éléments f, g et h du questionnaire de préférence à un résumé descriptif a été confirmé par l'enquête. En effet, 32 se sont déclarés pour, 7 ont préféré le résumé et 6 n'avaient pas de préférence.

La date de début du projet a manqué dans 30% des réponses. Elle aurait été négligée pour être considérée comme peu importante et pour n'être pas bien déterminée dans le cas des projet n'ayant pas fait l'objet de contrats. Une telle lacune n'est pas grave, elle peut être complétée facilement au téléphone.

L'indexage par les chercheurs eux-mêmes peut être considéré, dans l'ensembe, valable et réaliste. Les spécialistes de l'information scientifique pourront en juger par la suite en examinant les premiers fascicules à paraître. On pourrait l'améliorer en fournissant aux chercheurs un thésaurus ou plus simplement une liste de descripteurs. Le problème d'un indexage efficace reste quand même posé.

La langue n'a pas constitué un obstacle à ce stade puisque les chercheurs pouvaient répondre en français ou en anglais. Dans les sciences agricoles et médicales, la majorité des réponses étaient en anglais tandis que dans les autres disciplines les proportions étaient presque égales.

9. Traitement

Considérant le nombre de projets et le caractère expérimental de notre travail, nous avons opté pour le traitement manuel. Le fichier adopté est un fichier: chercheur, numéro du projet, discipline scientifique et matières. Pour les disciplines c'est la nomenclature internationale standard préparée par l'UNESCO qui sert comme base. Les questionnaires remplis qui constituent notre base de données sont classés par institution, département et chercheur principale,ce qui nous permet de vérifier rapidement la couverture de notre registre.

Avant la fin de 1975, nous espérons pouvoir produire un fascicule sur les recherches agricoles et un autre sur les sciences médicales. Ils reproduiront in extenso toutes les données fournies par les chercheurs. Ils auront des index: matière, chercheurs, institution et source de financement. Le fascicule sur les sciences agricoles sera notre contribution au projet CARIS.

Un fascicule sur les sciences exactes et les sciences de l'ingénieur sera publié plus tard sous la forme d'un index seulement. Dans ce cas des photocopies des notices détaillées des projets pourraient être fournies sur demande.

Ainsi nous aurions présenté aux chercheurs deux modèles du répertoire. D'après l'enquête, 26 préfèrent la publication in extenso, 17 l'index seulement et 2 n'ont pas de préférence. Nous avons choisi les sciences agricoles et médicales pour la publication expérimentale in extenso parce qu'elles intéressent beaucoup plus de monde et sont plus liées au développement du pays.

La langue du répertoire et la langue d'indexage est l'anglais. Les titre des projets fournis en français seront traduits en anglais mais la description figurera dans sa langue d'origine.

Nous n'excluons pas la mécanisation du répertoire. A ce stade la mise sur ordinateur sera essayée sur un set de projets en vue de l'étude de faisabilité de cette mécanisation. Nous comptons sur les résultats de ce Colloque pour nous guider dans cette voie. Les échanges internationaux entre les systèmes nationaux d'information sur les recherches en cours doivent avoir nécessairement lieu et de ce fait la normalisation de l'information doit précéder toute mécanisation.

10. Actions à entreprendre

Le problème à résoudre est la collecte de l'information. Elle doit devenir facile et rapide et avoir une couverture presque totale. Pour en arriver là, nous allons proposer aux responsables des institutions la mise au point d'un questionnaire commun et unique qui sera distribué par les institutions. Il sera rempli une seule fois par le chercheur. Une copie sera conservée par l'institution pour son registre et une autre sera utilisée par nous pour le répertoire. Afin d'encourager les institutions dans cette voie nous pensons leur proposer de sortir sur ordinateur le listing correspondant à chacune d'elles.

Les questionnaires seront alors distribués en avril-mai avec une date limite pour les réponses fixée au 30 septembre. Ainsi le répertoire pourrait être disponible vers la fin de la même année. A la lumière de cette première expérience nous pourrions envisager par la suite la possibilité de recueillir ces données à n'importe quel moment de l'année et faire des sorties périodiques et des sorties annuelles.

Les chercheurs et les institutions ayant participé à notre premier répertoire recevront un exemplaire gratuit des premiers fascicules. Les autres institutions, et surtout à l'étranger, pourront l'obtenir en échange d'une information similaire. Les agences de financement recevront également un exemplaire gratuit pour les inciter à nous signaler, au fur et à mesure, les projets qu'elles financent dans notre pays.

11. Le questionnaire

Des lacunes ont été constatées dans notre premier questionnaire. Nous allons signaler les plus importantes:

- Institution. Nous avions envisagé seulement l'institution où se fait la recherche. Nous devons tenir compte aussi de l'institution à laquelle appartient le chercheur qui dans certains cas n'est pas la même que la première.

- But du projet. Il nous est apparu utile de préciser le but académique du projet: thèse M.S., Ph.D. ou autre doctorat.

- Chercheur-principal. Dans le cas d'une thèse, nous pensons que l'étudiant devra être considéré comme le chercheur principal et il faut dans ce cas prévoir une nouvelle case dans le questionnaire pour désigner le directeur de thèse ou le superviseur de la recherche.

- Date de fin du projet. Elle doit figurer sur le questionnaire pour qu'elle soit précisée dans le cas des projets récemment terminés. Pour les projets en cours, cette date sera à notre avis peu significative.

- Montant du financement. Un tel renseignement est utile pour les planificateurs de la recherche et les responsables de la politique scientifique. Il intéresse moins les chercheurs qui seront peu disposés à le signaler. Dans certains cas, il sera même très difficile de le chiffrer, surtout quand le projet n'a pas fait l'objet d'un contrat, comme les recherches faites sur le budget global d'un département. Rien n'empêche, cependant, de le solliciter à titre indicatif et facultatif.

- Liste des publications. Certains projets se prolongent assez longtemps, d'autres sont plus ou moins vite terminés. Il nous paraît souhaitable de connaître les références des publications faites par le chercheur dans le cadre de son projet. L'information sera ainsi plus complète.

- Texte explicatif. Un texte explicatif de tous les éléments du questionnaire doit accompagner chaque questionnaire quitte à être trivial.Une hésitation du chercheur devant un terme de ce questionnaire retarde son remplissage et nous occasionne un effort ultérieur de relancement et d'éclaircissement.

12. Perception par les chercheurs de l'intérêt du répertoire

Au cours de notre enquête, nous avons posé aux chercheurs la question suivante: Pensez-vous que le répertoire que nous sommes en train de préparer est utile? Si oui, précisez pourquoi. Deux chercheurs ont considéré qu'une telle information était inutile. L'un parce qu'il connaissait, dit-il, tous ceux qui travaillent dans son domaine et l'autre parce qu'il considère que l'information relative à son domaine est souvent confidentielle. Tous les autres ont répondu par l'affirmative en indiquant les principales raisons suivantes:

- Pour faire des contacts en vue d'échange d'information et de coopération	27 fois
- Pour éviter la duplication	15 fois
- Pour connaître ce qui se fait dans le pays	11 fois
- Pour identifier ceux qui travaillent dans la même branche	7 fois
- Pour s'orienter et avoir des idées	4 fois

Par contre, tous ont déclaré être prêts à contribuer au répertoire et à sa mise à jour annuelle.

13. Echanges internationaux

La diffusion d'un répertoire national des recherches en cours à l'étranger ne se justifie que si elle permet un échange d'information du même type. Effectuée à sens unique, elle reste non équitable. Pour qu'un tel système devienne international, il doit être un canal à double voie pour obtenir l'adhésion de tous. Pour qu'il se développe, il doit être facilement accessible et disponible.

Souvent, de nombreux mois s'écoulent entre la rédaction d'un article et sa parution dans la presse scientifique diminuant pour autant son intérêt pour les chercheurs et ralentissant le progrès scientifique. Dans les pays en voie de développement, ce retard est accru par les délais postaux qui peuvent atteindre dans certains cas plusieurs mois. Dans ces conditions,les publications scientifiques deviennent un registre, une sorte de tableau d'honneur, plutôt qu'une information destinée au progrès scientifique.

Ainsi, il ne suffit pas à notre avis d'avoir un système international qui fournirait à la demande un listing, et éventuellement les photocopies des notices descriptives des projets. Cette méthode est coûteuse et peu pratique pour de nombreux pays en voie de développement. De nombreux chercheurs risquent d'être rebutés par la procédure.

Il serait peut-être souhaitable de sortir de cette base internationale de données une publication trimestrielle ou annuelle, paraissant en plusieurs fascicules, signalant les projets en cours, indexés convenablement et même en détail. Un organisme central recueillera l'in-put fourni par les centres nationaux pour constituer la base internationale de données. Pour alléger cette base et faciliter la traduction automatique et la production de fascicules en plusieurs langues, la description du projet ne sera pas incluse dans la base, ni éditée. Un indexage approprié à la source selon des normes qui restent à étudier pourrait suffire.

Ce problème sera débattu à part, au cours de ce Colloque, et nous ne voulons pas anticiper. Nous avons exprimé simplement notre vision de cet échange international auquel nous ne pouvons éviter de penser chaque fois que nous réfléchissons au développement de notre système.

14. Conclusion

Notre expérience dans la préparation du répertoire national des recherches en cours au Liban peut être considérée comme satisfaisante et fort instructive. Les difficultés rencontrées et les erreurs commises n'ont pas constitué un obstacle; nous avons essayé de leur trouver les solutions adéquates.

Bien que nous n'ayons pas pu bénéficier à temps du guide UNISIST à ce sujet, nous saluons cette initiative de l'UNESCO qui fournit un guide fort utile mais qui ne remplace peut-être pas l'expérience nationale.

Ce Colloque sera certainement très enrichissant pour nous et nous aidera non seulement dans le développement de notre système national mais aussi dans l'établissement et le développement de nos échanges avec d'autres pays, et je tiens à remercier ici les promoteurs et les organisateurs de ce Colloque.

Le Centre de Documentation et d'Information Scientifique du Conseil National de la Recherche Scientifique du Liban est déterminé à poursuivre ses efforts pour réussir et améliorer continuellement son système et souhaite vivement l'établissement d'une coopération internationale dans ce domaine à laquelle il est prêt à contribuer de son mieux.

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Session II
Part 6
Paper 21

Summary

AN ADMINISTRATIVE DATA BASE ON SCIENCE AND TECHNOLOGY USED AS A SOURCE OF INFORMATION ON ONGOING RESEARCH - PAST EXPERIENCE AND ENVISAGED NEW STEPS IN BELGIUM

The paper covers the computerized data base on Belgian science and technology potential. It develops how the data base came into existence, as a means for meeting governmental statistical needs; how the integrated links between soft data /titles, names, addresses/ and hard data /finance, manpower, costs/ proved useful for many purposes related to policy analysis; how the publication of the titles of ongoing research projects became an appreciated by-product of the data base, notwithstanding its present shortcomings /among which delay and insufficient subject indexing are the principal ones/; and how we envisage remedying these inconveniences in the future.

Résumé

UNE BASE DE DONNEES ADMINISTRATIVES SUR LA SCIENCE ET LA TECHNOLOGIE UTILISEE COMME SOURCE D'INFORMATION SUR LES RECHERCHES EN COURS - L'EXPERIENCE PASSEE ET LES NOUVELLES MESURES ENVISAGEES EN BELGIQUE

Cet exposé traite de la base de données sur support informatique qui a été établie sur le potential scientifique et technologique de la Belgique. L'auteur montre comment on a été amené à créer cette base de données pour répondre aux besoins statistiques des services publics, comment les liens intégrés entre les données sur l'aspect logiciel /titres, noms, adresses/ et les données sur l'aspect matériel /financement, personnel, coût/ se sont souvent révélés utiles pour l'analyse des politiques; comment la publication des titres des projets de recherche en cours est devenue l'un des aboutissements les plus appréciés de l'institution de cette base de données, malgré ses imperfections actuelles /dont les principales sont le retard et l'insuffisance de l'indexation par matières/ et la manière dont on envisage de remédier ultérieurement à ces inconvénients.

AN ADMINISTRATIVE DATA BASE ON SCIENCE AND TECHNOLOGY USED AS A SOURCE OF INFORMATION ON ONGOING RESEARCH - PAST EXPERIENCE AND ENVISAGED NEW STEPS IN BELGIUM

J. DEFAY

1. In short

The Belgian data base on the science and technology potential was at its beginning /1961 and 1963/ no more than a statistical survey of R & D expenditures. The dominant concern at the time was measuring the nation's scientific effort in order to compare it with other nations' efforts, and to draw from such comparisons new motivations for additional expenditures with a view to "filling the gap", perceived or supposed by policy makers.

Administrative circumstances caused this statistical survey to be organized by the user administration itself /Science Policy Services, attached to the Prime Minister's department/ instead of being carried out by the Institut National de Statistiques. This circumstance made it possible to gradually transform the survey into an administrative data base capable of responding to almost every need for information felt by the administration /needs for description, for listing and for addressing included/ while a statistical survey provides aggregate quantitative information only[1].

The data base was computerized in 1967. At that moment, however, descriptive information stored in alphabetical signs were limited to the names of scientific units, their addresses and the names of their heads. Research themes /or projects/[2] had not been punched from the form and transferred on to magnetic discs, because the number of letters involved was large and also because their treatment and classification was still unhandy. All other information in the base were quantitative.

Almost at the same time, as there was a growing concern with the quality of the environment, the minister decided to work out a national research programme on pollution and pollution control. On that occasion, the administration felt the need to avail itself of manageable descriptive information about the ongoing research project or themes related to any given objective. It was decided at that time to enter the research themes into the data base.[3]

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[1] In Belgium, as in several countries, the statistical Office is bound to keep the individual information secret, even towards ministries, which receive only aggregate figures. In contrast the information in a data base is not merged. The individual data remain available. Though contributed voluntarily and hence not absolutely exhaustive they have a much larger scope of usefulness.

[2] The vocabulary remains uncertain in this regard. "Project" is often used to designate the programme element giving way to a special funding. "Theme" is more general. The R & D activity in a scientific unit can be distributed under a number of themes, of which a few may be formally organized as "projects" while others remain informal categories.

2. The administrative data base

As far as the selection process is adequate, the data base provides, for any set circumscribed by any number of criteria /called a "sub-universe"/ a complete list in clear of the research projects or themes, accompanied /facultatively/ by figures about costs /of several natures/ by figures about manpower quantities /scientific and auxiliary personnels/, and by the addresses enabling requestors to get in touch with the researchers. Connection with the manpower card-filer /kept on the same computer/ even makes it possible to list the names of all scientists and engineers working on each project, with their university degrees or skills, their function in the unit, their sex, age and nationality, the language in which they studied at college, and the share of their work time which they devoted to the project during the year under review.

The sub-universe limits are chosen by indexing the characteristics of the scientific unit and of the project. The most used codes concern research objectives and scientific disciplines. Up to three objectives and three disciplines are selected from the nomenclature for each theme or project by the unit head. Also indexed are: the geographic location of the unit, its administrative dependance and the origin of funds devoted to the project or theme.

The flexibility of the system is appreciated, for it provides contents analyses for different purposes and, consequently, with widely differing limit patterns: for establishing a national programme, aiming at a definite objective /like environment control, energy conservation, accident rate reduction, etc./; for preparing measures aiming at a better balance between regions; for evaluating the needs of a given skill or training /physicians trained in computer science, biochemists, biophysicists, etc./.

At the present stage, however, it does not permit a refined selection of contents, the sort needed for bibliographical searches. This is a consequence of the brevity of the research objectives nomenclature. The latter was therefore experimentally completed with a KWIC /key words in context/ classification of the research themes, the most significant words having been earmarked during punching. This makes a purely thematic entry into the data base possible when needed, with alphabetically ranked vocables. It is seldom used.

Up to now, the small amount of research done in the country /2500 scientific units, less than 20 000 research themes/ made it possible for the user to be content with such limited classification entries as discipline or objective codes. As a matter of fact, they always permit restricting the field to a few dozen titles or themes to be checked manually. In many cases the refined selection could thus occur by hand. The detection of ongoing research by interested scientists appeared as a by-product of the administrative data bank and never was a main purpose of the system. It is only afterwards that such an opportunity did appear and that it was decided to publish a "science and technology yearbook" for the use of researchers. In the yearbook, the scientific units /laboratories, services, centres/ are ranked according to their administrative dependance. Indexes by discipline and research objective are provided in appendix, with a view to permitting the reader to retrieve all research themes related by their subjects. Such a simple system seems to be satisfactory, since the number of questions put directly by users to the service is small. All Belgian scientific units received a copy of the yearbook as a compensation for the information supplied by them to the data base.

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[3] They are published in offset from computer print-outs, every second year. The Science and Technology Yearbook, published by the "Services de la politique scientifique", Brussels, is available to all participants of the symposium who wish to receive it. Please apply to the meeting secretariat or by mail to SPPS, rue de la Science 8, B-1040 Bruxelles /Belgium/.

Nevertheless, it seems obvious that the classification would no longer suffice if there were 5 or 10 times more units and themes. The nomenclature of objectives, in particular, was not worked out in sufficient detail to narrow down the scope of a search very much. /N.B. It was derived from NABS: nomenclature des communautés européennes pour l'analyse des budgets scientifiques/. The main shortcoming seems to be the time-lag before the information is made available to the users.

5. Shortening the information lag for the researcher

Up to three years elapses between the moment a research project was started and the moment its first results become ready for publication. The publication delay of an article in a scientific journal being rather long /1 to 2 years/, an interested researcher would hear of another team working on the same subject from a bibliographic search ex post facto with a time-lag of about 5 years. The opportunity to get in touch early and fruitfully is obviously reduced by such delay. Fortunately, the interested scientists happen to meet with each other in symposia and scientific meetings. The need remains, however, for more systematic information on researchers and projects going on elsewhere. An information system should be complete and efficient in its selection. It should also reduce the time-lag below 2 years from the onset of the project.

This target has not yet been reached by the Belgian yearbook. The reason is that the yearbook is published only after completion and correction of all financial and quantitative data in the base, a correction that takes a lot of time. Moreover, in order to collect these financial data, one has to wait for the end of the financial year for which accounting figures are requested, while the collection of "soft" data on themes could certainly take place at an earlier date in the year.

In order to cut delays, we decided that next year's yearbook would no longer be the ultimate by-product of the inventory of the science and technology potential, but would become its initial phase instead. We shall thus start the 1975 inventory by sending to each unit, during the early winter months of 1975-76, a listing of the themes declared by them during the previous inventory. They will be invited to delete the concluded projects and to add the themes of the new research projects started in 1974 or 1975.[4/] These data will be immediately stored on disc, so as to permit the printing of the yearbook in Spring 1976. Meanwhile, collection of the quantitative and financial data would commence on January 2d, 1976, the data base bearing the date of 31/12/1975 being supposed to be completed by the end of 1976 or the first half of 1977. This is the best we hope to be able to do for the moment.

Later, direct access through terminals by the librarians of the universities and research centres could cut the time lag by another 4 months, the time needed for printing and circulation of the yearbook. In an equally imprecise and probably remote future, the national data base will be fed directly from the internal management information systems /MIS/ of universities and research centres, these systems obtaining their data in turn from current

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[4/] By the way, units having been too laconic in the description of their research themes will be requested to provide a more explicit wording. Wished length lies between 10 and 20 words.

administrative facts. For instance, when a research project is started, an expenses account will be opened in the computerized accounting of the institution. This first action will give early information in magnetic bits containing, eventually, the title of the research theme. The information would make its way to the data base during the year by way of cable, disc or tape connection, without any further need for a periodic enquiry on the science and technology potential and on ongoing research. Information on any new project would thus be carried over to the other research teams in a very short time. Though no new technology is implied the difficulties and the obstacles to establishing compatible MIS in the universities and connecting them with the national data base are great and justify the time horizon.

4. Improving the indexation of themes for their selection

From the moment when the interconnection of national systems will pool the information on ongoing research for a large set of countries, the number of themes or projects addressed to the same objective will become considerable and a more precise indexing will be indispensable; too broad a selection produces listings too long to be read through by the user, whenever the stock is large.

But a narrower retrieval should also be accurate, lest a number of relevant titles be left out. An identical problem is encountered with automatic bibliography and selective dissemination of documentary information, the principal objective of UNISIST.

There would be an evident advantage, in the long run, to use of the same system of index or of key words to characterize both the research projects and the published research results. In both cases, the task is to define in code the scientific contents of an activity, starting from a title of about 20 words or from an abstract about ten times that length. Whether one utilizes a decimal nomenclature of the UDC type or a thesaurus of concepts represented by key words /related or not by syntax links/ ex post facto automatic bibliograpny does not differ from the selection of themes of ongoing research. We might call the latter "ex ante facto bibliography". The number of titles to be entered and indexed is of the same magnitude /the number of articles published in a year for 100 ongoing research projects being, from first evaluations, somewhere between 50 and 200/.

However, before UNISIST agreements will cover all sciences and techniques with adequate plurilingual thesauri, it will not be possible to index all research themes following the rules agreed to under the UNISIST system. In time, strict adherence to UNISIST rules would undoubtedly provide a definitive solution to the problem.

Any unit head would then address the following request to his institution's librarian: tell me what has been published on the subject, and whether research projects are going on elsewhere with the same orientation. From his computer terminal, the librarian would answer the first half of the request by querying the magnetic tapes exchanged under the international arrangements on automatic bibliography, and the second half by querying the data base/s/ on ongoing research. Both queries would use the same indexes or key words, for the greater comfort of users.

Meanwhile, three temporary solutions seem possible.

First solution

Indexing disciplines and research objectives according to internationally agreed upon nomenclatures, more detailed than those now in use in most countries. UNESCO was invited by the United Nations /ECOSOC, Committee of Science and Technology for Development, 2d session, 1974/ to "serve as a focal point" for establishing such nomenclatures. The work is in progress. A nomenclature of disciplines has already been published /ISN or "international standard nomenclature"/. A nomenclature of objectives is being worked out.

The nomenclatures may be of the decimal type /an arborescence of concepts/ and comprise up to four levels or digits. There exists indeed a practical limit to the use of hierarchical nomenclatures by non-specialists and this limit seems to be three or four figures. Belgian experience suggests that it is practicable to provide the unit head or his delegate /usually the secretary of the service or the laboratory/ with nomenclatures of objectives and disciplines comprising not more than 4 levels, as an appendix to the survey form, and to leave it to that person to choose the indexes. The advantage lies in the fact that the person in question has an understanding of the subject and of the related categories in the nomenclatures. At any rate, he or she has competent advice close at hand.

The Broad System of Ordering /BSO/ worked out by UNISIST can also be used for the purpose since it is in fact a nomenclature of disciplines /with alphabetical entry/.

Any more complicated indexing system demands the presence of professional indexers at the data base. The latter team, unless it comprises quite a few people, will not have a scientific culture with a broad enough scope to be able to select the right code-number in every field of science and technology. Assembling such an indexing team is a problem indeed, not likely to be solved except in the long run, and within the framework of comprehensive systems for automatic bibliography for which projects exist in most countries. Indexing by the unit head therefore appears to be the surest and the least costly of short term solutions. But it has its practical limits: not more than 4 digits.

It provides a first sorting out, allowing the dispatching of the themes or abstracts to the specialized teams for refined indexing in the sector or field systems /most of these systems will operate by search in free text, as the number of fields covered by thesauri is limited/. The specialized systems will avail themselves of the information on ongoing research as an input and distribute it to the researchers together with the bibliography on any subject.

The advantage of this first solution is its compatibility with the present state of sector or field documentation systems, most of which /with the exception of INIS/ are neither world-wide nor plurilingual.

Second solution

It consists of using UDC or any ad hoc code, richer in concepts than the nomenclatures of objectives and disciplines, but poorer than the indexes or thesauri designed for automatic bibliography. It probably requires the presence of a team of professional indexers at the data base.

Third solution

It is the first solution with the addition of the automatic bibliography indexes on disc whenever they exist /in fields where thesauri have been elaborated and are in general use already/. The practical procedure for the data base would be to send the titles of the research themes to the indexers of the bibliographic system in each field, with a view to processing them as an article reference, and to return the refined indexes or descriptors to the data base for entry in the magnetic register. The solution does not require the presence of a team of professional indexers at the data base since it makes use of the indexers of the bibliography system, whenever and wherever they exist. Its drawback is the limitation of refined contents analysis to fields already covered by a world-wide or regional agreement.

It should be noted that the data base will probably require from the unit head something more than a title in a dozen words or so: ideally, a description of the research project in standard abstract length. From that moment, those data bases which store titles only will probably have to enlarge their storage capacity to store abstracts also. It means a step towards a better service, but at greater cost.

5. The usefulness of the administrative data base. Its requirements

In many countries, statistical needs and information needs on ongoing research gave birth to entirely distinct systems. The statistician had little concern for research themes and categorized them unhandily. The bibliographer or the researcher had little interest for costs, expenditures and manpower quantities.

Circumstances favoured in Belgium the establishment of a single data base, with a view to answering, from the same set of data, the queries of administrators and treasury people and those of the scientists.

In fact, the policy maker needs both. His approach is always qualitative, like the scientist's. He needs however to be exactly informed of the costs of activities and of manpower quantities applied to them. He proceeds by establishing programmes and by working out functional or objective-oriented budgets. As such budgets need to be based on a precise cognizance of ongoing expenditures, the aim of every outlay has to be characterized. The need arises thus of relating descriptive information to quantitative hard data. It entails that each scientific unit, next to the list of its themes and activities, should also indicate how its resources /its researchers' working time included/ are distributed under them. Neither the collection nor the treatment of such information presented great difficulties in practice.

The purpose of the present paper is to speak to countries possessing neither elaborate science statistics, nor any register of ongoing research, and try to convince them not to establish separate systems. A single data base on science and technology will cost less and provide better service, both to policy makers and to scientists.

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Session II
Part 6
Paper 22

Summary

COLLECTION AND DISSEMINATION OF INFORMATION ON ONGOING RESEARCH IN POLAND

There is a clear need for national systems of ongoing research information and an important role for these systems as integral components of both national scientific information services and world scientific collaboration. The paper discusses this need and examines the general difficulties involved in collecting, processing and providing for the use of information on ongoing research.

The current situation in Poland is presented in terms of the theoretical factors which support the existing system and the practical problems inherent in its operation which still require attention. Central to these, and central to the problem of international exchange, is the necessity to convince the "providers" and the "receivers" of ongoing research information that the existence of a system to support its collection and dissemination is both valuable and necessary. To achieve that goal at national levels, the information in the system must be both timely and of high scientific quality; at international levels the information available from national systems must represent more or less the same level of quality.

The needed level of scientific quality can be attained if ongoing research information systems are designed to provide for the preparation of substantive scientific information by properly qualified information officers. The paper concludes that, within the national range as well as internationally, the training of cadres of information officers should be seen as one of the most important factors in system planning and operation and discusses the theoretical and practical questions involved in the training programme.

Résumé

METHODES DE COLLECTE ET DE DIFFUSION DE L'INFORMATION SUR LES RECHERCHES EN COURS EN POLOGNE

Les systèmes nationaux d'information sur les recherches en cours répondent à un besoin manifeste et sont destinés à jouer un rôle important car ils constituent un élément essentiel à la fois des services nationaux d'information scientifique et de la collaboration scientifique mondiale. L'auteur de l'exposé examine ce besoin et les problémes généraux que posent le rassemblement, le traitement et la diffusion de l'information sur les recherches en cours.

Il donne un aperçu de la situation actuelle en Pologne en décrivant les facteurs théoriques à la base du système actuel et les problèmes pratiques de fonctionnement qui requièrent encore l'attention. L'essentiel à ce niveau comme à celui de l'échange international des informations est de convaincre ceux qui "fournissent" et ceux qui "reçoivent" les données sur les recherches en cours qu'il est intéressant, voir nécessaire, de mettre en place un système pour assurer le rassemblement et la diffusion des renseignements. Pour que cet objectif soit atteint à l'échelon national, il faut que l'information contenue dans le système soit à la fois à jour et de haute qualité scientifique; à l'échelle internationale, l'information fournie par les systèmes nationaux doit être de qualité pratiquement identique.

La qualité scientifique nécessaire peut être obtenue s'il est prévu dans les systèmes d'information sur les recherches en cours de confier la préparation des données scientifiques fondamentales à des spécialistes dûment qualifiés. En conclusion, l'auteur déclare que la formation de spécialistes de l'information devrait être considérée sur le plan national comme sur le plan international, comme l'un des éléments les plus importants de l'élaboration et de la gestion des systèmes et il examine les problèmes théoriques et pratiques de tout programme de formation.

COLLECTION AND DISSEMINATION OF INFORMATION ON ONGOING RESEARCH IN POLAND

J. SACH

During the last decade an average citizen has heard more about coexistence, disarmament, disengagement or détente than about the science and scientific discoveries, but this does not mean that science has not developed rapidly. Between 1960 and 1970, as Georges ANDRELA recalls in his "Information in 1985", the volume of scientific knowledge doubled or grew even more rapidly in some fields of science. There are many signs that we should expect more rapid growth of knowledge /and consequently of information/, because of the need /some call it "the hunger for knowledge"/ is still greater. The role which science has to play in preserving mankind and meeting human needs is unique. Scientists, rather than politicians, are expected to find solutions for such problems as population growth, energy shortage crises, malnutrition, etc. The importance of these problems is shown by our present-day crowded streets, shortages of living space and other kinds of deprivation coupled with the virtual certainty, that the world population will double in the next 33 years.

No scholar will deny that he feels a responsibility and refuse to cooperate. But an individual can now do very little, and even scientific teams have limited possibilities due to many factors. Let us mention only some of them:

a/ increasing costs of research;

b/ increasing numbers of publications and limited capacity to assimilate information;

c/ limited technical equipment /labs, installations, etc./.

Therefore, a division of work seems to be necessary.

Of course, a science governs itself by different lights than development of industry, and no one can guarantee that research team A will conduct its research from point 1 to point 2 and research team B will continue from point 2 to point 3 and so on. Sometimes research teams will cross their "fields". This is unavoidable, but one of the aims of an information service is to limit a number of such "unavoidable" cases to a minimum by supplying information on research already done and on ongoing research, and thus allow efficient use of time and resources by each individual or collective researcher.

Looking forward to the development of scientific information services, some conclusions may be drawn from existing experiences. Scientific information will help scholars if it is timely, sufficiently detailed and global.

The problem of timeliness is almost solved by computerized processing and the application of communications. However, one must remember that these methods can be applied only after accumulating sufficient experience. Scholars are skeptical in their outlook. It is not enough to show them a magnetic tape and say: "here you have a remedy for your problem".

From actual experience, one may draw the conclusion that the implementation of an automated system of scientific information without previous sufficient preparation of users may bring fewer benefits than expected. One must realize that progress in the field of automation of information processes is now very rapid. This education of the users of automated systems of scientific information does not mean a delay of the whole process - it only means that we might profit from the experiences of others running information systems.

The problem of completeness of information is partly connected with technical processing of information, but first of all it is a problem of preparation of the information to be processed and disseminated.

Thus we come to the problem of "who" and "how". A "receiver" is interested in obtaining information on the problem that he is investigating that is as complete as possible. Who, then, should prepare the information, who should be a "provider"? The ideal answer is that the best qualified man for the preparation of information on a certain work is the author of that work himself. Logically, if the work done is by a team of authors, the whole team should prepare the information, because each member of the team knows the most about his segment of that work. Such a picture looks ideal. But how can one persuade a distinguished author or even a team of distinguished authors to prepare information on the work they have completed or intend to complete, taking into consideration that they are normally busy people who do not like to deal with "bureaucracies". An offer of payment for such information could be made, but one should realize that although a financial stimulus is important, it is not a decisive one. Thus we come to the non-material sphere.

There should be feedback between the "providers" and the "receivers". Those groups could be interchangeable. The "providers" sometimes act as "receivers" and vice versa. The first group should realize that they will receive as complete information as they need, if they provide complete information on their own work. The feedback between two groups starts to act, not on a base of financial stimulus, but on a base of common interest. But one may ask if such a solution is of value from an economic point of view. Namely, in the case of a prominent scholar, is the time he spends preparing the information about his work worth the benefits?

In less ideal circumstances, filling out an information sheet is in most cases routine work, normally done by a clerk. And it often happens that a secretary to a prominent scholar does this type of work. But one should remember that while a secretary to a prominent chemist should be a good typist, must know foreign languages and be able to perform office work, he or she is not necessarily a chemist by training. And therefore the information the secretary prepares may be very good from the linguistic point of view, but not satisfactory enough for another chemist who receives it.

These are the ideal and less than ideal cases. Let us choose the medium between them and draw the following conclusion: If the information is to be sufficiently comprehensive, it should be prepared by a well-qualified information officer.

In our opinion an information officer should be regarded as a member of the research team, and have the full rights of a scholar. He should have professional qualifications in the field in which he works and he should possess additional qualifications in informatics on science. These additional qualifications permit the information officers to find "the same language", whether they act as "providers" or "receivers". They will then more easily understand each other. Therefore let us underline that proper preparation of information officers on the national and international levels seems to be a very important factor in the construction of any information system, including a system of information on ongoing research.

What seems particularly important is to assure to information officers a status which will keep them within their profession. Stability of cadres working for an information system is one of the factors which decides the quality of such a system. In each country training of the information cadres is different because the level of scientific information differs. When building an international system on ongoing research - which will be difficult because of different national policies in many countries - it seems highly appropriate to start from the very beginning /apart from technical problems requiring solution/ and that is the preparation of cadres for that system.

We have mentioned before that a scientific information system intended to help scholars should be as global as possible. By that we mean that the system should cover planned, ongoing and completed research, and that it should be interdisciplinary. It is difficult to predict how well an information system will cover planned research, because the approach to planning of science in each country is different.

But having in mind what has been said above about the tasks of scientific information in meeting human needs,it seems necessary that a system on ongoing research should cover as wide a field as possible.Of course, any kind of information concerning ongoing research is valuable; but the possibility of fulfillment of all the tasks which are set up before science depends in high degree on a rational division of work. For that purpose, the establishment of an international system of information on ongoing research is of greatest significance.

An international system of information on ongoing research should, and probably must, be based on national systems. At present, in Poland there is a collection of secondary sources concerning ongoing research on a national level. This collection consists of "notification cards" on all ongoing research which are sent to the central information unit on the country level. An additional source for verification of that collection are long- and short-term plans for ongoing research for financial purposes. However, the scientific value of the collection is doubtful because cards are often filled out by people who are not properly qualified. It is also difficult to predict whether this collection, at its present stage, may be considered as a base for an international system, because of its lack of compatibility with other existing collections or systems.

The technical plans for an automated system on planned, ongoing and completed research in Poland are presented in another paper, prepared by Professor Konrad FIALKOWSKI.

DISCUSSION, Session II, Part 6

Moderator: B. HOLMBORN

Due to the time limit no discussion took place after the presentation of the three papers.

SESSION III

MEETING USER NEEDS: CURRENT SERVICES AND FUTURE POSSIBILITIES

COMMENT REPONDRE AUX BESOINS DES USAGERS: SERVICES ACTUELS ET POSSIBILITES FUTURES

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Session III

Part 1

Paper 23

Summary

USER NEEDS OF INFORMATION IN DEVELOPING COUNTRIES

In developing countries, the users of information about ongoing research fall broadly into two categories namely:

1/ research workers and
2/ policy makers.

The category of research worker includes specialists in widely differing areas and the main sources from which they get relevant information are current journals and periodicals and in some cases, advance letters and abstracts.

The category of policy maker includes research managers, planners, heads of government agencies and national organisations which are responsible for channelling ongoing research in their countries to suit the needs of development. This category of users also has to depend, for getting the information they need, on the main scientific libraries of the country into which some material flows casually but not as a result of systematic and conscious collection.

In the first category, there is an average time lag of about six months between the date of receipt of a research paper by the editorial board of a journal and the date of its publication in the journal. There is a further average time lag of about four months between the date of publication of a research paper and date of its receipt in a developing country. This is a serious handicap for those engaged in research work on current problems.

In the second category, on account of past traditions and practices, the libraries in most developing countries concentrate on subscribing to standard journals and do not make a conscious effort to obtain material relevant to development science and to application of science and technology to problems of developing countries.

More sophisticated sources of information do not exist in most developing countries.

In the context of these and other handicaps, a strong case exists for reviewing the whole position with regard to developing countries as to the availability to different users of information relating to ongoing research in science and more particularly in the area of development science and in aspects covering the application of science and technology to currently valid problems of developing countries.

Résumé

LES BESOINS DES UTILISATEURS EN INFORMATION DANS LES PAYS EN VOIE DE DEVELOPPEMENT

Dans les pays en voie de développement, les utilisateurs d'informations sur les recherches en cours se répartissent en deux grandes catégories;ce sont:

1/ des chercheurs ou
2/ des responsables politiques.

La catégorie des chercheurs englobe des spécialistes de disciplines très différentes dont les principales sources d'information sont les revues et périodiques sur les travaux en cours et, parfois, les lettres annonçant certains projets et les résumés analytiques.

La catégorie des responsables politiques comprend des administrateurs de la recherche, des planificateurs et des directeurs d'organismes d'Etat et d'organisations nationales chargés d'adapter les recherches aux besoins du développement national. Cette catégorie d'utilisateurs s'adresse également, pour obtenir l'information qui lui est nécessaire, aux principales bibliothèques scientifiques du pays qui reçoivent certains matériaux mais de manière occasionnelle et non à la suite d'un effort systématique et consciencieux.

Au niveau de la première catégorie, on constate un décalage d'environ six mois entre la date de réception des comptes-rendus de recherche par la rédaction des revues et celle de leur publication. Il existe en moyenne un décalage supplémentaire d'environ quatre mois entre la date de publication et la date de réception de la revue dans le pays en voie de développement. Tout ceci constitue un lourd handicap pour les chercheurs qui ont entrepris des recherches dans un domaine d'actualité.

Au niveau de la seconde catégorie, il faut constater qu'en raison de traditions et de pratiques anciennes, les bibliothèques de la plupart des pays en voie de développement s'emploient surtout à prendre des abonnements aux grandes revues sans faire d'effort délibéré pour obtenir des matériaux qui intéressent le développement et l'application de la science et de la technologie aux problèmes des pays en voie de développement.

Dans la plupart des pays en voie de développement, il n'existe aucune autre source d'information plus complexe. Compte tenu des ces handicaps et d'autres encore, bien des raisons poussent à reconsidérer l'ensemble de la situation des pays en voie de développement en ce qui concerne la fourniture aux différents utilisateurs d'informations sur les recherches en cours dans le domaine scientifique et plus particulièrement dans celui de la science du développement et de l'application de la science et de la technologie aux véritables problèmes actuels de ces pays.

USER NEEDS OF INFORMATION IN DEVELOPING COUNTRIES

S. BHAGAVANTAM

Introduction

COSTED, Committee on Science and Technology in Developing Countries, of which the author of this paper is the President, is primarily concerned with enabling developing countries to use science and technology effectively for promoting development. It follows that this can be possible only if there is a prompt flow of information between various countries of the world. We are aware that one of the objectives of this symposium is to narrow the gap existing between developed and the developing countries in regard to availability of information. In this process, one should take care to see that the information made available is of the right type, and is available at the right time.

Information is generally understood to mean knowledge already published or intended for publication, consisting of facts and ideas along with the necessary correlations and interpretations, if any, to allow useful application. Information in this form is a tool which helps one to solve a problem by introducing new ideas therein or revealing unknown aspects of the problem, sometimes opening up unforeseen opportunities. In this manner, a piece of information enables one to accomplish one's goals, either as a policy maker or as a researcher, more effectively and efficiently than one could have otherwise. The result of the effective communication of information to a user is that he is enabled to apply mid-course corrections, alterations and so on, and change his programme when found necessary. It is obvious that if this is not done, a whole spectrum of duplication becomes a probability. Appropriate information must be readily available to the user so that he may not only prepare the right plan for achieving his objective, but also make a change when the necessity is perceived.

Some common handicaps

Research that is being currently carried out is called "ongoing research". Ongoing research workers in most developing countries depend, for information, on scientific publications published outside their own countries. Personal contacts are available to only a few, and they are generally infrequent. Such publications are in several languages, frequently unfamiliar to the researcher. The number of these publications is increasing at a fast rate as is the cost. Also, most libraries in developing countries are suffering from shortages of funds and manpower. Some of the staff are often untrained. However, the needed information has to be collected and supplied to the scientists. Then alone can the work of the scientists in a developing country make the right impact on the main objective of all such work: to improve the economic backwardness of the countries concerned as quickly as possible.

The impact of information on a piece of research in progress is usually varied. In a survey of such impact of information on ongoing research carried out by ASLIB /Association of Special Libraries Information Bureau/ the responses from 245 scientists were analysed with the following results 1/:

1/ Use of Information in Research, Invention and Innovation: Case studies by Neelameghan A.

	Number of responses
1. Information made available indicated duplication of work of others	43
2. Information, had it been previously known, would have lead to:	
a/ planning research differently	36
b/ altering the plan of research in progress	60
c/ saving of time, money and research potential	106
	245

Users of information

Users of information in developing countries fall broadly into two categories, namely, research workers and policy makers. The category of research workers includes specialists in widely differing areas and the main sources from which they get the relevant information are current journals and periodicals, and in some cases, advance letters and abstracts.

The category of policy makers includes research managers, planners, heads of government agencies and of national organisations who are responsible for channeling ongoing research in their country to suit the needs of development. These users must also depend on the main scientific libraries of the country for getting information. Some material flows into these libraries casually, but not as a result of systematic and conscientious collection. Thus, policy makers generally make decisions without sufficient information relevant to such decisions. If they had access to existing but now unavailable information, they would be in a position to make wiser decisions and make their investments more effective allocations of the limited resources available to them.

Large time lag in getting information

At the present time, the increase in the volume of printed matter and recorded information has become bewilderingly large. In the field of science and engineering alone, there are over 60 000 books, 1 000 000 research reports and patent literature and over 12 000 000 articles in various journals and conference proceedings each year. Such growth in knowledge demands highly organised retrieval systems[2].

The main sources through which the two categories of users get information in developing countries broadly include current journals, periodicals and advance letters. Ninety-five percent of the relevant information about ongoing research is being collected through journals and reports. The remaining five percent is being collected through various channels like personal contacts, visits to international conferences, meetings and information dissemination centres.As I mentioned earlier,getting information through the latter channels is infrequent as the opportunities for such contacts are relatively rare in developing countries. The large time lag that exists in a developing country in getting information is an important parameter. Taking India as an example, I have collected and presented in the following table the figures for the time lag between the date of receipt of the paper to its publication in a standard journal /T_1/, and for the time lag between publication and the receipt of that journal by a widely accessible research library /T_2/.

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[2] Indian Association of Special Libraries and Information Centres, Sixth Seminar, Nov. 1970. Editorial by T.K.S. Iyengar.

Journal/letter	T_1 /in months/	T_2 /in months/
A. Foreign journals		
1. Journal of the Physical Society of Japan	6	3
2. Physical Review B	5	4
3. Journal of Physics	4	5
4. Physica	4	7
5. Journal of the American Chemical Society	6	5
6. Tetrahedron	6	4
7. Comparative Biochemistry and physiology	14	2
8. The Biochemical Journal	12	6
B. Letters		
9. Physics Letters	3	3
10. Applied Physics Letters	4	4
11. Physical Review Letters	2	12
C. Local journals		
12. Indian Journal of Pure and Applied Physics	8	1
13. Indian Journal of Physics	8	2

T_1 : Average time lag in publishing the paper /Date of receipt of the paper - Date of its publication/.

T_2 : Average time lag in getting the paper into the country. /Date of publication - Date of its receipt/.

The figures show that on the average, there is a time lag of about 5 to 6 months in the publication of a paper in a journal and an additional time lag of about 4 months for the receipt of that journal by a research library in a developing country like India. The situation is probably worse in many other developing countries. Thus, the users of information in these countries are not aware of the latest work until 9 to 10 months after it has been published. In the case of letters, the corresponding time lags are on the order of 3 to 4 months.

Meeting the needs of the second category of users, the policy makers, is a vital need at the present moment in many developing countries. On account of past traditions and practices, the libraries in most developing countries concentrate on subscribing to standard journals, and do not make a conscientious effort to obtain material relevant to development science and to application of science and technology to problems of developing countries.

More sophisticated sources of information do not exist in most developing countries. Research libraries in developing countries are mostly of recent origin, and the nature of problems in all of them is somewhat similar. Specifically, there is a lack of resources and healthy traditions regarding the collection of material relevant to development science. The documentation work in developing countries is also of recent origin, and a vast field remains yet to be covered. In most developing countries, research workers are not in a position to use the international documentation lists, which are, in any case, very late in reaching them. Documentation lists available in local libraries are reported as being less than helpful; most of the sources referred to therein are not available in the local libraries. The coverage by the documentation lists needs to be expanded, particularly in view of the potential demand of the users in developing countries. Steps have to be taken to reduce the time lag.

Creation of technical information centres

The knowledge of users information needs is a fundamental requisite for planning the work of the information departments. The information needs should be regarded as determining the base structure on which an efficient information system is to be built. A plan leading to such an infrastructure in groups of developing countries geographically located as neighbours in a given region does not seem to be available. The information departments should work closely with their users in determining the information needs. The users, on the other hand, should not be passive recipients of information, and accept whatever casually or traditionally comes to them. Rather they should be active partners and guide the information departments to selectively seek such material as is relevant to developing countries and the region, /if selective seeking becomes a necessity for economic or other reasons/.

The question of standardisation at three levels - institutional, national and international, has often been raised. This is important, and the impact of standardisation on the smaller and the comparatively underdeveloped countries, which cannot afford a very complex indexing system, should be carefully considered.

In the context of these and other handicaps, a strong case exists for review, with regard to developing countries, of the availability to different users, of the right type of information relating to ongoing research in science, and more particularly, in the area of development science, and the application of science and technology to currently valid problems of developing countries.

The Government of India has taken initial action in setting up the National Information System on Science and Technology /NISSAT/. Within the framework of this programme, attempts should be made to organise data bases in various sectors at an institutional level, and develop expertise and an awareness of the importance of a national information system, ultimately to be linked to an international system. Identification of and pooling of resources of existing special libraries is important and would avoid unnecessary duplication and expenditure.

Speaking particularly in the context of smaller developing countries located in a given region, information needs being similar in many such developing countries, one can confidently feel that the problem may be solved to some extent by setting up:

a/ Regional information systems containing all the existing information. Thus, for example, all Southeast Asian countries could have one or two information systems and they should have all the latest information collected therein.

b/ National information systems, one for each nation, containing all the relevant information and having contacts with the regional information systems.

Sooner or later, it appears that every country should have its own information system containing all the latest information on ongoing research in that country and also have access to a wider information system.

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Session III

Part 1

Paper 24

Summary

DEVELOPING COUNTRIES AND THE NEED FOR INFORMATION

Much has been said about the necessity, especially in developing countries, of coordinated planning of communication systems with the objectives of economic, social and educational development and thus, to try to narrow the gap existing between developed and developing countries.

However, there is a failure to appreciate the role of information on research in progress and on new developments in different fields /in connection with university course planning and economic planning/, on the part of planners and organizations and there is an absence of appropriate, improved methods for the dissemination and collection of the information. There is also a lack of cooperation, in most cases among the various departments concerned with both the research centres in developed countries and the information centres in developing countries.

For these reasons, among many others, the situation does not seem favourable from the point of view of communication plans linking developed countries with developing countries. However, experience reveals reasonable grounds for further development in this respect.

In order to achieve a deeper understanding and more effective coordinated planning in the field of information development in developing countries, regional and international agencies should learn before anything else how to coordinate their schemes and activities with concerned national bodies, at least in order to provide a good example for coordinated planning and minimize waste in financial, technical and human resources. Considerable attention should also be given to efforts to convince planners of the importance of the uses of information on research and development available in different countries.

In addition, the international agencies /e.g. UNESCO/ should establish large information centres with up-to-date details on research in progress in developed countries and circulate the information to the developing countries. Also international agencies should communicate to the developing countries new developments and improved technology in the collection, storing, and dissemination of this information. A great deal could be done in this respect with the new generation of communication technology and new computer systems.

For example, a great deal could be done:

1/ to coordinate information activities with other Audio-Visual media;

2/ by convincing educational authorities of the importance of information on research in progress.

Résumé

LES PAYS EN VOIE DE DEVELOPPEMENT ET LES BESOINS D'INFORMATION

On a souvent souligné qu'il est nécessaire, en particulier dans les pays en voie de développement, d'élaborer des systèmes d'information en rapport avec les objectifs du développement économique, social et éducatif pour essayer de réduire l'écart entre ces pays et les pays développés.

Cependant, des planificateurs et les organisations n'ont pas suffisamment conscience du rôle que joue l'information sur les recherches en cours et sur les diverses découvertes récentes /au stade de la planification de l'enseignement universitaire et de l'économie/ et les méthodes utilisées pour le rassemblement et la diffusion des données sont inadéquates et devraient être améliorées. En outre, dans la plupart des cas, il n'y a pas de coopération entre les différents services intéressés, les centres de recherche des pays développés et les centres d'information des pays en voie de développement.

Pour toutes ces raisons, parmi bien d'autres, la situation actuelle n'est pas satisfaisante en ce qui concerne l'établissement de plans reliant les pays développés et les pays en voie de développement en ce qui concerne l'information. Cependant, l'expérience acquise fait apparaître des motifs raisonnables d'espérer certains progrès futurs à cet égard.

Pour mieux comprendre les problèmes et assurer une planification coordonnée plus efficace afin de développer l'information dans les pays en voie de développement, les organisations régionales et internationales devraient avant tout apprendre à coordonner leurs programmes et leurs activités avec ceux des organismes nationaux intéressés, ne serait-ce que pour donner l'exemple de la planification coordonnée et pour réduire le gaspillage de ressources financières, techniques et humaines. Il faudrait également s'employer activement à convaincre les planificateurs de l'importance que présente l'utilisation des informations sur les travaux de R et D qui existent dans différents pays.

De plus, les organisations internationales telles que l'UNESCO devraient créer de grands centres d'information disposant de renseignements détaillés et à jour sur les recherches en cours dans les pays développés et diffuser ces informations dans les pays en voie de développement. Elles devraient aussi faire connaître aux pays en voie de développement les découvertes et les progrès techniques réalisés dans le domaine du rassemblement, du stockage et de la diffusion des informations. Il y aurait beaucoup à faire à cet égard en ce qui concerne la nouvelle génération de moyens techniques de communication et les nouveaux systèmes d'informatique.

Par exemple, il y aurait beaucoup à faire pour

1/ coordonner les activités d'information avec celles des autres moyens audio-visuels,

2/ persuader les responsables des services d'éducation de l'importance que présente l'information sur les recherches en cours.

DEVELOPING COUNTRIES AND THE NEED FOR INFORMATION

A.M.H. ALMASHAT

Abstract

In order to achieve a better understanding and more effective, coordinated planning in the field of information development in developing countries, regional and international research documentation centres in the field of scientific research should be established. These centres would reduce the time delay for the information on outgoing research to arrive to the developing countries.

These centres should learn, before anything else, how to coordinate their scheme and activities with the concerned national bodies to minimize waste of financial, technical and human resources.

With the new generation of communication and data processing technology, a great deal can be achieved in the field of scientific research in both the developing and the developed countries.

Introduction

To try to narrow the gap existing between developed and developing countries, much has been said about the necessity of coordination of communication systems with the objectives of economic, social and educational development.

However, there is a failure to appreciate the role of the information on research and the new technological developments in different fields on the part of planners /e.g. economic planners/ and organizations, and an absence of appropriate, improved methods of collection and dissemination of the required information. There is also a lack of cooperation in most cases from the various departments concerned with both research centres in developed countries and the information centres in developing countries.

For these reasons, among others, the situation does not seem favourable from the point of view of communication plans linking developed and developing countries in the field of research information.

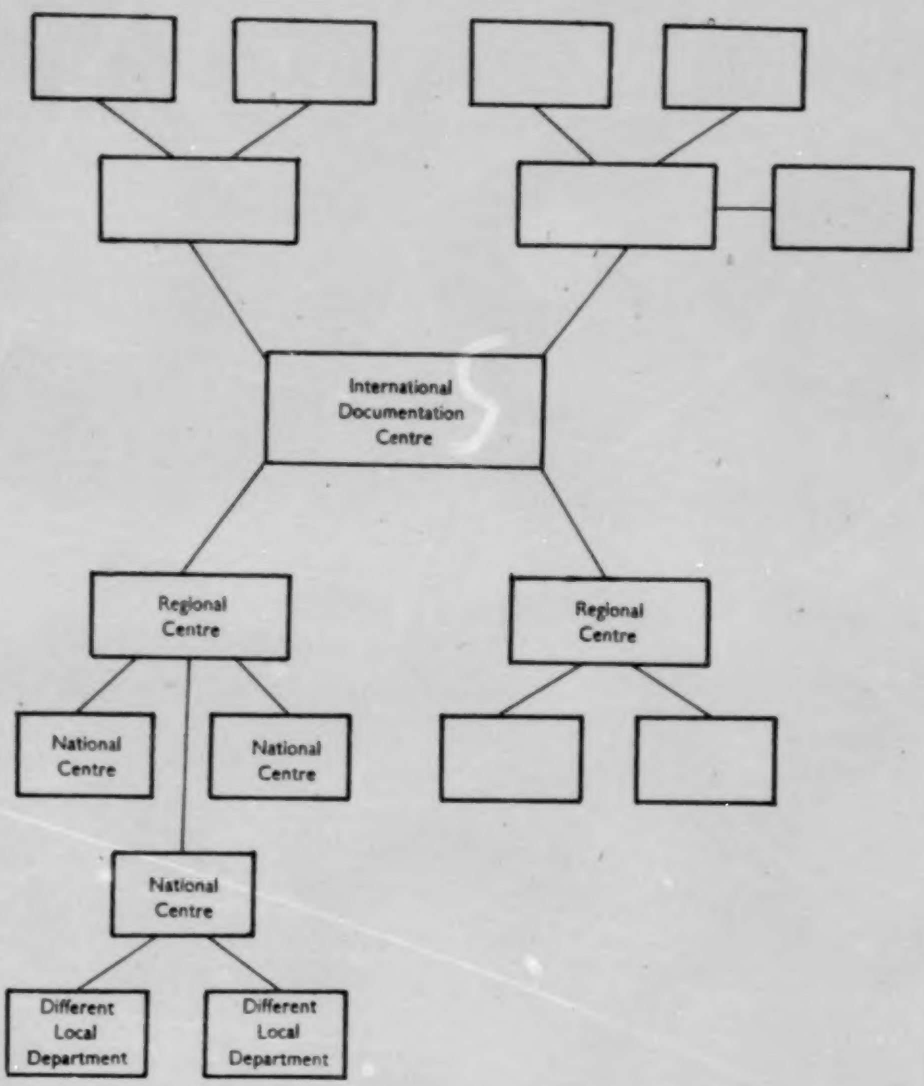
A. Proposed Scheme

In order to overcome the problems in the field of transfer of information on scientific research, the following scheme is proposed, which is composed of:
1/ An international centre; 2/ Regional centres; 3/ Local centres.

1. International centre:

   An international documentation centre which belongs to an international organization should be established /which is the case of UNISIST/. The centre should keep up up-to-date information on research carried out in developed countries and also in developing countries. The centre should have the means of getting information on different aspects of research, since there is some research information in developed countries which is not published for many reasons, one being financial. The centre should be equipped with large data processing systems, audio and visual equipments, and have a skilled and experienced staff in the main

INFORMATION FLOW CHART


International Documentation Centre
Regional Centre
Regional Centre
National Centre
National Centre
National Centre
Different Local Department
Different Local Department

N.B. Regional Centres should first be established in developing countries.

branches of scientific research and documentation. The centre must coordinate its plans with the different research and university centres in order to receive up-to-date and full information of work being done in the field of research.

2. Regional centres:

   Regional research documentation centres should be formed, especially in the developing regions, which are branches of the international centre. The main objects of these centres are /a/ to link the local centres and the international centre, and /b/ to link the local centres themselves.

   These centres would cooperate with the local documentation centres to receive, send and exchange information about research being carried out within that region. This would be of great importance in linking the local research centres with each other and would avoid having the same research being carried out, with the same environmental conditions, in neighboring countries. Regional centres would also transfer the information from local centres to the international centre and vice versa.

   Regional centres should emphasize to educational authorities and planners the importance of the uses of information on research and development available in different countries. This can be achieved by organizing periodical seminars and meetings between the local centres within the region.

   Effort should also be made to give advice in the coordination of research schemes and activities with concerned national bodies.

3. Local /National/ centres

   In each country there should be a local /national/ documentation centre which can provide the information about research going on in the different organizations within the country and also in other countries. The information about research from other countries can be received by the local centre from the regional centres.

   Such local centres are usually located within the national research organization in the developing countries.

Advantages of the proposed scheme

The information about research carried out in the developed countries is mainly limited by the scientific publication /e.g.proceedings, transactions, etc./. The publications might not all be received by the developing countries. And for the few that are being received, the time lag between the finishing of a research project and the reception of the information about it may be a period of more than one year.

Also, there are many research problems which are not published before few years pass, sometimes for economic reasons.

By establishing an international centre and regional centres for the documentation of information on research, the delay can be reduced greatly; information about research can be transmitted directly from the local centres without the delay of the scientific publications. Moreover, the increase in the exchange of information about research can service the gap between the developed and developing countries. It is of value to point out that easier and quicker exchange of information on research can help, in part, to slow the brain-drain of scientists from developing countries where they are sorely needed.

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Session III
Part 1
Paper 25

Summary

MEETING THE INFORMATION NEEDS OF RESEARCH PLANNERS

An ongoing research information system must provide the research scientist with the following information: who is doing the research, where is it being conducted, what are the objectives, and what is the approach or plan of work. This can be accomplished by periodically producing a complete directory or inventory, by producing selected subject catalogues of special high-interest research, or by providing customized on-demand retrieval service. In addition, scientists also find annual reports of accomplishments and publications associated with the research to be useful.

On the other hand, research administrators and planners need more than technical abstracts and associated scientific information in order to make the kind of decisions they face in these days of increased competition for available resources. They need a quantitative measure of resources being expended on today's research. They need to know the amount of funds and scientist man-years of effort devoted to each area of research. One way this may be accomplished is by utilizing a research classification scheme consisting of a number of categories that can be used to aggregate research programmes into units of measure that can be analyzed and evaluated by research planners.

This paper demonstrates some of the many ways in which technical and/or quantitative data can be aggregated and displayed for use by research planners by the Current Research Information System of the U.S. Department of Agriculture.

Résumé

COMMENT REPONDRE AUX BESOINS D'INFORMATION DES PLANIFICATEURS DE LA RECHERCHE

Un système d'information sur les recherches en cours doit permettre au chercheur scientifique de savoir: qui effectue la recherche, où sont menés les travaux, quel est leur objectif et quelle est l'approche ou le plan de travail adopté. Ce résultat peut être atteint grace a l'établissement périodique d'un répertoire ou d'un inventaire complet, à l'établissement pour certaines disciplines de catalogues des travaux de recherche particulièrement intéressants, ou à la fourniture sur demande de services de recherche documentaire spécialisée. En outre, les scientifiques estiment utiles les rapports annuels sur les résultats obtenus et sur les publications en rapport avec la recherche effectuée.

Par contre, les résumés techniques et les informations scientifiques comparables ne suffisent pas aux administrateurs et aux planificateurs de services de recherche et ne leur permettent pas de prendre le type de décision auquel ils doivent parvenir en ces temps de concurrence accrue pour l'obtention des ressources disponibles. Il leur faut une appréciation quantitative des ressources consacrées aux recherches en cours. Ils ont besoin de connaître le montant des

sommes et le nombre d'années de travail et de chercheurs consacrés à chaque domaine de la recherche. L'un des moyens d'y parvenir est d'utiliser un système de classification de la recherche comportant diverses catégories qui peuvent servir à regrouper les programmes de recherche en unités de mesure que les planificateurs de la recherche sont à même d'analyser et d'évaluer.

L'auteur du document montre quelques uns des nombreux procédés employés par le Current Research Information System du Département de l'agriculture des Etats-Unis pour regrouper et présenter les données techniques ou quantitatives de manière qu'elles puissent être utilisées par les planificateurs de la recherche.

MEETING THE INFORMATION NEEDS OF RESEARCH PLANNERS

J.R. MYERS

A research scientist looks at an ongoing research information system to provide him with information such as; who is doing the research; where is it being conducted; what are the objectives; what is the approach or plan of work; and what results have been achieved to date.

Publications associated with the research can also be very useful. A research information system can accomplish this in several ways: 1/ by periodically producing a complete directory or inventory, 2/ by producing selected subject catalogs of special high-interest research, or 3/ by providing customized on-demand retrieval service.

Research administrators and planners need more than the usual technical information in order to make more effective use of available resources. In order to plan the research needed in the coming decade, they need a quantitative measure of today's research activities by specific fields. They need to know the expenditures and scientist-years of effort devoted to each area of research. Yet they don't have time to look at each and every project within the area of research under consideration. They must be able to look at the overall picture in different ways and from several angles. They must be able to organize the overall research program into manageable units that can be analyzed and evaluated.

The U.S. Department of Agriculture /USDA/ considered both the research scientist and the research planner when it established the Current Research Information System /CRIS/. As a result, CRIS is one of the few systems that combine technical and quantitative data together in an effective and workable package.

CRIS was designed and developed in 1967-1968 and became fully operational in 1969. It was designed to serve three major goals: 1/ to serve as the U.S. Department of Agriculture's research project system; 2/ to improve communications among the Federal-state research scientists, especially with regard to ongoing research; and 3/ to provide Federal-state research managers with up-to-date and coordinated planning information.

At the present time, the CRIS data base consists of 22 669 Research Work Units /Projects/ sponsored or performed by six USDA research agencies, 55 state Agricultural Experiment Stations, 13 Forestry Schools, and 18 Other Cooperating Institutions. Approximately two-thirds of the work units in CRIS are funded in total or part by USDA, the remainder are funded from state and other Federal sources and submitted voluntarily by the state Agricultural Experiment Stations. In Fiscal Year 1974 the research reported to CRIS consisted of 10 612,7 scientist-years of effort supported by $ 729 226 948.

The basic unit of documentation and reporting is the Research Work Unit /Project/ which is defined as a research activity at a single location which focuses on a clearly definable problem, a sizeable phase of a very big problem, or a few closely related elements of interest which together form a logical and manageable package.

Each Research Work Unit includes descriptive information consisting of the basic fields of project identification /i.e., responsible organization, performing organization, investigators, location of research/ as well as textual fields /i.e. title, objectives, approach, and annual progress and publications/. Also, annual funds expended and scientist-years of effort must be reported for each Research Work Unit. Funds are defined as actual obligations rounded to the nearest dollar. A scientist is defined as a research worker with a rating of Assistant Professor or equivalent rank, or higher, and who is responsible for independent scientific study, thought originality, judgments and accomplishments directly assignable to the unit of work reported.

For technical retrieval purposes, each Research Work Unit is indexed according to a CRIS authority file. At the present time, the authority file is an alphabetical listing with no cross-reference or generic-specific hierarchies. There are approximately 14 000 key words in the System with new terms being added at a rate of about 1000 per year. An average of twelve subject index terms are assigned per Research Work Unit. This authority file undergoes periodic revision to achieve higher levels of retrieval efficiency and user satisfaction.

In addition, and this is the key to research planning adaptability, each input unit is classified and coded in accordance with a Federal-State classification scheme. Categories include Type of Research /Basic, Applied, Developmental/; Activity /general purpose/; Commodity or Resource; Sub-Commodity; Field of Science /discipline/; Research Problem Area; and a number of special interest categories, such as Pesticides, Pollution, Weather, and Medical or Health-Related. Percentage of effort is assigned in each category by the person completing the form. This percentage of effort allows the System to reflect only the applicable portion of funds and scientist-years when aggregating data by the various categories.

The CRIS Classification Scheme is fully described in the USDA publication "Manual of Classification of Agricultural and Forestry Research", Revision II, February 1973. Copies of the four major categories are reproduced in ANNEX I. Table 1 lists the 40 Activities which describe the purpose or nature of the research. Table 2 lists the 58 Commodity, Resource, or Technology categories. Table 3 lists the 102 Research Problem Areas which are broken into 9 goals representing a framework for meeting overall national objectives. Table 4 lists the 78 Fields of Science or Disciplines.

ANNEX II shows an example of a typical Research Work Unit and how it has been classified. CRIS Form AD-416 lists the title, objectives, approach, and keywords. CRIS Form AD-417 is the classification document. This Research Work Unit was carried out by a biochemist on corn and soybeans and had to do with biological efficiency and the effects of environmental variables. In the judgment of the researcher, the work was equally split between biological efficiency and control of other hazards on both corn and soybeans. This resulted in the four lines of classification shown on the AD-417 on lines 41-44.

Line 41 - "Activity" - 4700 /Protection against Weeds, etc./, "Commodity" - 1400 /Corn/, "Field of Science" - 0112 /Biochemistry and Biophysics-Plant/, "Research Problem Area" - 209 /Control of Weeds and Other Hazards/, "Percentage of Effort" - 25%.

Line 42 - "Activity" - 4900 /Biology of Plants and Animals/, "Commodity" - 1400 /Corn/, "Field of Science" - 0112 /Biochemistry, etc./, "Research Problem Area" - 307 /Improvement of Biological Efficiency/, "Percentage of Effort" - 25%.

Line 43 - "Activity" - 4700 /Protection against Weeds, etc./, "Commodity" - 2300 /Soybeans/, "Field of Science" - 0112 /Biochemistry, etc./, "Research Problem Area" - 209 /Control of Weeds and Other Hazards/, "Percentage of Effort" - 25%.

Line 44 - "Activity" - 4900 /Biology of Plants, etc./, "Commodity" - 2300 /Soybeans/, "Field of Science" - 0112 /Biochemistry, etc./. "Research Problem

Area" - 307/Improvement of Biological Efficiency/, "Percentage of Effort" - 25%.

By utilizing the Percentage of Effort when preparing Commodity summary tabulations only 50% of the reported expenditures and scientist-years would be aggregated with corn. The other 50% would be aggregated with soybeans. In effect then, if 1,6 scientist-years /SYS/ was reported on the project in question, ,8 SYS would be attributed to corn and ,8 SYS to soybeans in any commodity tabulation. The same thing holds for Research Problem Area tabulations, 50% of the expenditures and scientist-years would be aggregated with "209" Control of Weeds and Other Hazards and 50% with "307" Improvement of Biological Efficiency

Up until 1972, research planners depended primarily on allocation reports reflecting aggregation of funds and sicentist years of effort by Commodity or Research Problem Area.

Table 1	Commodity - National Summary
Table 2	Research Problem Area - National Summary
Table 3	Commodity - USDA Summary
Table 4	Research Problem Area - USDA Summary
Table 5	Commodity - Agency Summary
Table 6	Research Problem Area - Agency Summary

In 1974, after several years of development, a new approach to National and Regional Planning was implemented. This paper concerns only those aspects of the planning system that relate to CRIS.

The basic intent of the new planning scheme was to take a fresh look at the coordination of Agricultural and Forestry Research. A Committee made up of Federal and State research planners came up with a way of organizing the total Federal-State research program into a series of meaningful and manageable units and sub-units.

The first step consisted of conceptually dividing the total program into seven /7/ major areas called Research Program Groups /RPG's/.

1:00	Natural Resources
2:00	Forestry
3:00	Crops
4:00	Animals
5:00	People, Communities, and Institutions
6:00	Competition, Trade Adjustment, Price, and Income
7:00	General Resource or Technology

The first four /4/ are Commodity-or Resource-oriented, five /5/ and six /6/ are people-and activity-orinted, and seven /7/ is for general application.

These seven /7/ groups were then subdivided into 48 Research Programs /RP's/, /ANNEX III, Table 1/. At that time, a detailed look at the CRIS classification scheme was conducted and it was determined that the present classification could be directly related to the newly developed 48 Research Programs.

A crosswalk was developed whereby each unique Commodity and Research Problem Area /RPA/ combination in CRIS was designated as relating to one of the 48 Research Programs. Each assignment was mutually exclusive in that each unique combination applied to only one of the Research Programs. This procedure insured that no duplication would occur in relating the CRIS data to the new National and Regional Planning scheme.

Once the new Research Program Group/Research Program concept was established and the CRIS Commodity and Research Problem Area crosswalk completed, it was an easy matter to incorporate the concept into CRIS.

ANNEX III, Table 2 shows an example of a crosswalk table for one Commodity. It shows all the possible Commodity and Research Problem Area combinations for Commodity 2300, Soybeans, and the applicable Research Program to which they were assigned.

Commodity - 2300 /Soybeans/ and Research Problem Area - 207 /Control of Pests/ relates to Research Program 3.06 /Soybeans/. This means the funds and scientist years reported on any Research Work Unit that has the above combination on any one line will be tabulated with the summaries for Research Program 3.06 /Soybeans/ in the amount indicated by the "Percent of Effort." Each line of classification is matched against the crosswalk table for designation of the proper Research Program.

Commodity - 2300 /Soybeans/ and Research Problem Area - 503 /Marketing Efficiency/ relates to Research Problem - 6.03 /Marketing and Competition/. Again, as above, this means that the funds and scientist-years reported on any project that includes this combination of Commodity and Research Problem Area on the same line will be tabulated as Research Program 6.03 /Marketing and Competition/ in the amount indicated by the "Percent of Effort."

Using these classifications, data can be aggregated in many ways. Lists can be generated showing time and money devoted to specific research topics or commodities, relative funding by Federal and state goverments, region where research is being done, etc.

Because of this highly developed and flexible Classification Scheme, CRIS has been able to provide an unlimited variety of reports while minimizing the time and cost for collection, storage, and retrieval of information.

The Classification system proved exceptionally adaptable to the new National and Regional Planning Scheme. Research is a dynamic endeavor and research planners are continually coming up with new ways to measure, compare, and project the amount of effort in the different areas of research. In the future, as new critical areas of research are identified, we have every confidence that CRIS can adapt to accommodate them.

ANNEX I

TABLE 1

CLASSIFICATION CODESHEET FOR REPORT OF AGRICULTURAL RESEARCH

/1/ ACTIVITY

Conservation, development and use of soil, water, forest and related resources

4100	Resource description and inventory
4300	Resource development, conservation and management
4400	Evaluation of alternative uses and methods of use

Protection of man, commodities, resources and their products from losses, damage or discomfort

4500	Protection against insects, mites, snails and slugs and their control agents
4600	Protection against diseases, parasites and nematodes and their control agents
4700	Protection against weeds and their control agents
4810	Protection against fire
4820	Protection against flood
4830	Protection against pollutants
4840	Protection against climatic extremes /frost, hail, wind, drought, etc./
4850	Protection against birds
4860	Protection against rodents and other mammals
4870	Protection against molds, fungi and other spoilage organisms
4880	Protection against allergens, toxins and poisonous plants
4890	Protection against radiation, noise and other hazards

Efficient production and quality improvement

4900	Biology of plants and animals
5000	Improving biological efficiency of plants and animals
5100	Increasing consumer acceptability of farm and forest products
5200	Mechanization, improvement of physical efficiency, and development of structures and facilities
5300	Management of labor, capital and other inputs

Product development and processing

5400	Chemical and physical properties of food products
5500	Developing new and improved food products and processes
5600	Chemical and physical properties of non-food products
5700	Developing new and improved non-food products and processes

Efficient marketing, including pricing and quality

5800	Identification, measurement and maintenance of quality
5900	Improving economic and physical efficiency in marketing including analysis of market structure and functions
6000	Analysis of supply, demand and price, including interregional competition
6100	Developing domestic markets, including consumer preference and behavior
6200	Foreign trade, market development and competition

Improvement of human nutrition, shelter, and consumer satisfaction

6300	Nutritional values, consumption patterns, and eating quality of foods
6400	Quality of family living, including housing, management and use of time, money and other resources

Development of human resources and of economies of communities, areas and nations

6500	Description, inventory and trends
6600	Economic development and adjustment
6700	Improvement of social well-being, including social services and facilities and adjustment to social and economic changes

General Methodology, Technology and Evaluation

7000	Design of experiments and methods of statistical analysis
7100	Improvement of research administration
7200	Information documentation and retrieval
7300	Evaluation of public programs, policies and services
7400	Improvement of agricultural statistics
7500	Development of research equipment and technology

ANNEX I

TABLE 2

COMMODITY, RESOURCE OR TECHNOLOGY NOT ASSOCIATED WITH SPECIFIC COMMODITIES

0100	Soil and land
0200	Water
0300	Watersheds and river basins
0400	Air and climate
0500	Recreational Resources
0600	Trees, forests, and forest products /excluding edible tree nut crops /see 1015/, and tung /see 2560/
0700	Range
0800	Fish, shellfish, game and fur-bearing animals and other wildlife and their habitats
0900	Citrus and subtropical fruit
1000	Deciduous and small fruits and edible trees nuts
1100	Potatoes
1200	Vegetables
1300	Ornamentals and turf
1400	Corn /includes Popcorn/. /For Sweetcorn, see 1280/
1500	Grain sorghum
1600	Rice
1700	Wheat
1800	Other small grains
1900	Pasture
2000	Forage crops
2100	Cotton /including cottonseed for planting purposes/
2200	Cottonseed /for meal, oil, etc./
2300	Soybeans
2400	Peanuts
2500	Other oilseed and oil crops /excluding cottonseed/
2600	Tobacco
2700	Sugar crops
2800	Miscellaneous and new crops
2900	Poultry
3000	Beef Cattle
3100	Dairy Cattle
3200	Swine
3300	Sheep and wool
3400	Other animals /see 0850 for fur-bearing animals/
3500	Bees and honey and other pollinating insects
3600	General purpose supplies Includes: Machinery, equipment, fertilizers, feedstuffs, and pesticides
3700	Clothing and textiles
3800	Food /not readily associated with specific plant and animal products/
3900	Structures and facilities
4000	People as individual workers, consumers and members of society
4100	The family and its members
4200	The farm as a business enterprise
4300	Communities, areas and regions, including counties and States and their institutions and organizations
4400	Agricultural economy of United States and sectors thereof, including interrelationships with the total economy
4500	Agriculture economy of foreign countries and sectors thereof, including interrelationships with the total economy
4600	Farmer Cooperatives
4700	Marketing, processing and supply firms other than cooperatives
4800	Marketing systems and sectors thereof
6100	Weeds
6200	Seed research
6300	Biological cell systems
6400	Experimental design and Statistical methods
6500	Invertebrates /including insects, mites, ticks, snails, slugs, and leeches/
6600	Microorganisms, viruses, etc.
6700	Plants
6800	Animals /Vertebrates/
6900	Research on research management /not research management per se/
7000	Research equipment and technology /such as remote sensing/

ANNEX I

TABLE 3

RESEARCH PROBLEM AREAS /RPA'S/

GOAL I: Insure a stable and productive agriculture for the future through wise management of natural resources

101 Appraisal of Soil Resources
102 Soil, Plant, Water, Nutrient Relationships
103 Management of Saline and Sodic Soils and Salinity
104 Alternative Uses of Land
105 Conservation and Efficint Use of Water

106 Efficient Drainage and Irrigation Systems and Facilities
107 Watershed Protection and Management
108 Economic and Legal Problems in Management of Water and Watersheds
109 Adaptation to Weather and Weather Modification
110 Appraisal of Forest and Range Resources

111 Biology, Culture and Management of Forests and Timber-Related Crops
112 Improvement of Range Resources
113 Remote Sensing
114 Research on Management of Research

GOAL II: Protect forests, crops and livestock from insects, diseases and other hazards

201 Control of Insects Affecting Forests
202 Control of Diseases, Parasites and Nematodes Affecting Forests
203 Prevention and Control of Forest and Range Fires
204 Control of Insects, Mites, Slugs, and Snails on Fruit and Vegetable Crops

205 Control of Diseases and Nematodes of Fruit and Vegetable Crops
206 Control of Weeds and Other Hazards to Fruit and Vegetable Crops
207 Control of Insects, Mites, Snails, and Slugs Affecting Field Crops and Range
208 Control of Diseases and Nematodes of Field Crops and Range

209 Control of Weeds and Other Hazards of Field Crops and Range
210 Control of Insects and External Parasites Affecting Livestock, Poultry, and Other Animals
211 Control of Diseases of Livestock, Poultry and Other Animals
212 Control of Internal Parasites of Livestock, Poultry, and Other Animals

213 Protect Livestock, Poultry and Other Animals from Toxic Chemicals, Poisonous Plants, and Other Hazards
214 Protection of Plants, Animals, and Man from Harmful Effects of Pollution

GOAL III: Produce an adequate supply of farm and forest products at decreasing real production costs

301 Genetics and Breeding of Forest Trees
302 New and Improved Forest Engineering Systems
303 Economics of Timber Production
304 Improvement of Biological Efficiency of Fruit and Vegetable Crops
305 Mechanization of Fruit and Vegetable Crop Production

306 Production Management Systems for Fruits and Vegetables
307 Improvement of Biological Efficiency of Field Crops
308 Mechanization of Production of Field Crops
309 Production Management Systems for Field Crops
310 Reproductive Performance of Livestock, Poultry and Other Animals

311 Improvement of Biological Efficiency in Production of Livestock, Poultry and Other Animals
312 Environmental Stress in Production of Livestock, Poultry and Other Animals
313 Production Management Systems for Livestock, Poultry and Other Animals

314 Bees and Other Pollinating Insects
315 Improvement of Structures, Facilities and General Purpose Farm Supplies and Equipment
316 Farm Business Management
317 Mechanization and Structures Used in Production of Livestock, Poultry and Other Animals
318 Non-Commodity-Oriented Biological Technology and Biometry

GOAL IV: Expand the demand for farm and forest products by developing new and improved products and processes and enhancing product quality

401 New and Improved Forest Products
402 Production of Fruit and Vegetable Crops with Improved Acceptability
403 New and Improved Fruit and Vegetable Products and Byproducts
404 Quality Maintenance in Storing and Marketing Fruits and Vegetables
405 Production of Field Crops with Improved Acceptability

406 New and Improved Food Products from Field Crops
407 New and Improved Feed, Textile, and Industrial Products from Field Crops

408 Quality Maintenance in Storing and Marketing Field Crops
409 Production of Animal Products with Improved Acceptability

410 New and Improved Meat, Milk, Eggs, and Other Animal Food Products
411 New and Improved Non-Food Animal Products
412 Quality Maintenance in Marketing Animal Products

GOAL V: Improve efficiency in the marketing system

501 Improvement of Grades and Standards - Crop and Animal Products
502 Development of Markets and Efficient Marketing of Timber and related products
503 Efficiency in Marketing Agricultural Products and Production Inputs
506 Supply, Demand and Price Analysis - Crop and Animal Products

507 Competitive Interrelationships in Agriculture
508 Development of Domestic Markets for Farm Products
509 Performance of Marketing Systems
510 Group Action and Market Power
511 Improvement in Agricultural Statistics

512 Improvement of Grades and Standards of Forest Products
513 Supply, Demand and Price Analysis - Forest Products

GOAL VI: Expand export markets and assist developing nations

601 Foreign Market Development
602 Evaluation of Foreign Food Aid Programs
603 Technical Assistance to Developing Countries
604 Product Development and Marketing for Foreign Markets

GOAL VII: Protect consumer health and improve nutrition and well-being of the American people

701 Insure Food Products Free of Toxic Residues from Agricultural Sources
702 Protect Food and Feed Supplies from Harmful Microorganisms and Naturally Occurring Toxins
703 Food Choices, Habits, and Consumption
704 Home and Commercial Food Service

705 Selection and Care of Clothing and Household Textiles
706 Control of Insect Pests of Man and His Belongings
707 Prevent Transmission of Animal Diseases and Parasites to Man
708 Human Nutrition
709 Reduction of Hazards to Health and Safety

GOAL VIII: Assist rural Americans to improve their level of living

801 Housing
802 Individual and Family Decision Making and Resource Use and Family Functioning
803 Causes of Poverty Among Rural People
804 Improvement of Economic Potential of Rural People

805 Communication and Education Processes
806 Individual and Family Adjustment to Change
807 Structural Changes in Agriculture
808 Government Programs to Balance Farm Output and Market Demand

GOAL IX: Promote community improvement including development of beauty, recreation, environment, economic opportunity, and public services

901 Alleviation of Soil, Water and Air Pollution and Disposal of Wastes
902 Outdoor Recreation
903 Multiple Use Potential of Forest Land and Evaluation of Forestry Programs
904 Fish and Other Marine Life, Fur-Bearing Animals and Other Wildlife

905 Trees to Enhance Rural and Urban Environment
906 Culture and Protection of Ornamentals and Turf
907 Improved Income Opportunities in Rural Communities
908 Improvement of Rural Community Institutions and Services

ANNEX I

TABLE 4

CLASSIFICATION CODESHEET FOR REPORT OF AGRICULTURAL RESEARCH

/5/ FIELD OF SCIENCE

Biological

0110	Biochemistry and biophysics - animal
0112	Biochemistry and biophysics - plant
0113	Biochemistry and biophysics - human
0114	Biochemistry and biophysics - other
0210	Biology - Environmental, systematic, applied - animal
0212	Biology - Environmental, systematic, applied - plant
0213	Biology - Environmental, systematic, applied - human
0214	Biology - Environmental, systematic, applied - other
0310	Biology - Molecular - animal
0312	Biology - Molecular - plant
0313	Biology - Molecular - other
0410	Entomology - animal
0412	Entomology - plant
0413	Entomology - human
0414	Entomology - other
0510	Animal Genetics and Breeding
0512	Plant Genetics and Breeding
0513	Genetics - other
0610	Immunology - animal
0612	Immunology - plant
0613	Immunology - human
0710	Microbiology - animal
0712	Microbiology - plant
0713	Microbiology - human
0714	Microbiology - soils
0790	Microbiology - other
0810	Nematology - animal
0812	Nematology - plant
0813	Nematology - other
0910	Nutrition and Metabolism - animal
0912	Nutrition and Metabolism - plant
0913	Nutrition and Metabolism - human
0914	Nutrition and Metabolism - other
1010	Parasitology - animal
1012	Parasitology - plant
1013	Parasitology - other
1110	Pathology - animal
1112	Pathology - plant
1113	Pathology - human
1114	Pathology - other
1210	Pharmacology
1310	Physiology - animal
1312	Physiology - plant
1313	Physiology - other
1410	Virology - animal
1412	Virology - plant
1413	Virology - human
1414	Virology - other

Physical

1524	Chemistry - analytical
1525	Chemistry - inorganic
1526	Chemistry - organic
1527	Chemistry - physical
1528	Chemistry - soils
1529	Chemistry - other
1920	Engineering - agricultural
1924	Engineering - mechanical
1925	Engineering - electrical
1926	Engineering - civil
1927	Engineering - chemical
1928	Engineering - industrial
1929	Engineering - other
2020	Geology and geography
2120	Hydrology
2220	Mathematics
2230	Statistics and biometry
2320	Meteorology and climatology
2420	Physics
2421	Physics - soils

Social and Behavioral

2530	Anthropology
2630	Economics
2730	Education
2740	Information and Communication
2830	History
2930	Law
3030	Political Science
3130	Psychology
3230	Sociology
3310	Art and Architecture

ANNEX II

AD-416

U. S. DEPARTMENT OF AGRICULTURE
RESEARCH WORK UNIT/PROJECT DESCRIPTON – RESEARCH RESUME
U. S. DEPT. OF AGRICULTURE, STATE AGRICULTURAL EXPERIMENT STATIONS
AND OTHER INSTITUTIONS

Date (Day, Month, Year)

1 ACCESSION NO	AGENCY IDENTIFICIATION NO 2	3	4	5 WORK UNIT/PROJECT NO
0057187	CSRS	ILLU	0000	ILLU-15-9999

6 STATUS: NEW ☒ A EXTENDED ☐ B REVISED ☐ C DISCONTINUED ☐ D TERMINATED ☐ E PENDING ☐ F

7 TITLE

Chemical Plant-Plant Interactions as affected by Environmental Variables

8 PERFORMING ORGANIZATION

Agronomy
Agricultural Experiment Station
University of Illinois

CITY: Urbana
STATE/COUNTRY: Illinois
ZIP CODE: 61801
CONG. DISTRICT:

13 RESPONSIBLE ORGANIZATION

Agricultural Experiment Station
University of Illinois

CITY: Urbana
14 STATE: Illinois
ZIP CODE: 61801

12 INVESTIGATOR NAME(S) (Last name first): Koeppe D E
SOC. SEC. NUMBER(S):

15 RESPONSIBLE INDIVIDUAL (Last name first): Salisbury G W

16 RESEARCH LOCATION ON CAMPUS: YES ☒ A NO ☐ B

PROJECT TYPE

17 FOR USDA USE: CONTRACT ☐ A GRANT ☐ B COOP. AGMT. ☐ C IN-HOUSE ☐ D

18.1 FOR STATE USE: HATCH ☒ H McINTIRE STENNIS ☐ M STATE ☐ S

CONTRACTS, GRANTS AND COOPERATIVE AGREEMENTS

18.2 GRANT AUTHORITY: PL 89-106 ☐ A PL 85-934 ☐ B

18.3 DISP OF EQUIP.: NONE PURCHASED ☐ 1 REVERTS TO GOV'T ☐ 2 RETAINED ☐ 3

18.4 CONTR/GR/AGMT. NO.:
PL 480 FUNDS ☐ A ☐ K

19 FACE AMOUNT:
20 FY:
55 TOTAL SMY:

21 FACILITIES: FEDERALLY OWNED ☐ A FEDERALLY LEASED ☐ B COMBINED ☐ C STATE ☒ D OTHER ☐ E

22 23 REGIONAL PROJECT NO.:

24 OBJECTIVES 25 APPROACH (Use space needed for "24 OBJECTIVES", then indicate "25 APPROACH")

Determine whether compounds exuded from the roots of weed species are phytotoxic to corn and soybeans and whether environmental stress conditions influence these chemically mediated interactions. Isolate and identify the exuded compounds. Investigate the effect of identified or suspected phytotoxins on certain active processes in plants and isolated mitochondria.

25. Approach
Research will be to exclude competition per se and test the effect of specific root exudated compounds from several weed species on specific energy related growth reactions of corn and soybeans.

27 KEYWORDS

Plant-Growth Corn Soybeans Root-Excretions Phytotoxicity Toxicity Environmental-Stress Plant-Chemistry Weeds Interactions Isolation Identification Mitochondria Plant-Physiology Biochemistry

RECOMMENDED

SIGNATURE	TITLE	DATE

APPROVED — Check applicable one — CONCURRED

SIGNATURE	TITLE	DATE

TITLE DATE

[illegible]	[illegible]	[illegible]	[illegible]
	010770	303674	

ANNEX II

AD-417

U. S. DEPARTMENT OF AGRICULTURE
RESEARCH WORK UNIT/PROJECT DESCRIPTON – CLASSIFICATION OF RESEARCH
U. S. DEPT. OF AGRICULTURE, STATE AGRICULTURAL EXPERIMENT STATIONS
AND OTHER INSTITUTIONS

Date (Day, Month, Year)

1 ACCESSION NO	AGENCY IDENTIFICATION NO 2 | 3 | 4	5 WORK UNIT/PROJECT NO	31 HATCH MARKETING YES ☐ A NO ☒ B
32 BASIC RESEARCH 100 %	33 APPLIED RESEARCH %		34 DEVELOPMENT EFFORT %

CLASSIFICATION BY ACTIVITY, COMMODITY, SCIENCE, PROBLEM AREA AND PPBS CODES

	ACTIVITY		COMMODITY		SCIENCE		PROBLEM AREA	GOAL	PRODUCT OF (2) x (4) x (6)
	(1) CODE	(2) %	(3) CODE	(4) %	(5) CODE	(6) %	(7) CODE	(8) CODE	(9) %
41	4700	50	1400	50	0112	100	209	0200	25
42	4900	50	1400	50	0112	100	307	0300	25
43	4700	50	2300	50	0112	100	209	0200	25
44	4900	50	2300	50	0112	100	307	0300	25
45									
46									
47									
48									
49									
50									
51									
52									

SPECIAL CLASSIFICATION

SPECIAL CATEGORY	%	SPECIAL COMMODITY	%	PESTICIDE CODE	%	WATER RESOURCES CODE	-
55 Pollution related		62		68 Target I	50	73	
56 Health and medical related		63		69 Target II		74	
57 Tobacco-health related		64		70 Target III		75	
58 Weather related		65		71 Target IV		76	
59 Nuclear radiation related		66		72 Target V			
60 Poverty area related		67					
61 Natural beauty related							

79 COOPERATORS USDA ☐ A OTHER FEDERAL AGENCIES ☐ B INDUSTRY AND OTHER ☐ C STATE ☐ D	COOPERATING DEPARTMENTS WITHIN STATE PERFORMING INSTITUTION (List)
83 REPORTING DEPARTMENT WITHIN STATE PERFORMING	80
	81
	82

TABLE 1

ANNEX III

RESEARCH PROGRAM GROUP/RESEARCH PROGRAM

1.00 NATURAL RESOURCES
  1.01 Soil and Land Use
  1.02 Water and Watersheds
  1.03 Recreation
  1.04 Environmental Quality
  1.05 Weather Modification
  1.06 Fish and Wildlife
  1.07 Remote Sensing

2.00 FORESTRY
  2.01 Inventory and Appraisal of Forestry Resources
  2.02 Timber Management
  2.03 Forest Protection
  2.04 Harvesting, Processing, Marketing of Forest Products
  2.05 Forest Watersheds, Soils, Pollution
  2.06 Forest, Range, Wildlife and Fisheries Habitat Development
  2.07 Forest Recreation, Aesthetics, Landscape Values
  2.08 Alternate Uses of Land
  2.09 Technical Assistance

3.00 CROPS /Field and Horticultural/
  3.01 Corn
  3.02 Grain Sorghum
  3.03 Wheat
  3.04 Other Small Grains
  3.05 Rice
  3.06 Soybeans
  3.07 Peanuts
  3.08 Sugar
  3.09 Forage, Pasture and Range
  3.10 Cotton
  3.11 Tobacco
  3.12 New Crops and Minor Oilseeds
  3.13 Fruit
  3.14 Vegetable Crops
  3.15 Plants to Enhance Man's Environment
  3.16 Bees and Other Pollinating Insects

4.00 ANIMALS
  4.01 Beef
  4.02 Dairy
  4.03 Poultry
  4.04 Sheep
  4.05 Swine
  4.06 Other Animals
  4.07 Aquatic Food and Feedstuffs

5.00 PEOPLE, COMMUNITIES AND ISTITUTIONS
  5.01 Food and Nutrition
  5.02 Food Safety
  5.03 Rural Development and Quality of Family Living
  5.04 Insects Affecting Man and His Belongings
  5.05 Research on Administration of Research

6.00 COMPETITION, TRADE, ADJUSTMENT, PRICE AND INCOME
  6.01 Farm Adjustment, Prices and Income
  6.02 Foreign Agricultural Trade and Economic Development
  6.03 Markating and Competition

7.00 GENERAL RESOURCE OR TECHNOLOGY
  7.01 General Resource or Technology

ANNEX III

TABLE 2

RESEARCH PROGRAM CROSSWALK TABLE

COMMODITY 2300 SOYBEANS and Research Problem Area		Relates to Research Program	
207	Control of Pests	3.06	Soybeans
208	Control of Diseases	3.06	Soybeans
209	Control of Weeds	3.06	Soybeans
214	Protection from Pollution	1.04	Environmental Quality
307	Improvement of Biological Efficiency	3.06	Soybeans
308	Mechanization of Production	3.06	Soybeans
309	Production Management Systems	3.06	Soybeans
405	Production with Improved Acceptability	3.06	Soybeans
406	New and Improved Food Products	3.06	Soybeans
407	New and Improved Non-Food Products	3.06	Soybeans
408	Market Quality	3.06	Soybeans
501	Improvement of Grades and Standards	3.06	Soybeans
503	Marketing Efficiency	6.03	Marketing and Competition
506	Supply, Demand and Price Analysis	6.03	Marketing and Competition
507	Competitive Interrelationship	6.03	Marketing and Competition
509	Performance of Marketing Systems	6.03	Marketing and Competition
601	Foreign Market Development	6.02	Foreign Agricultural Trade and Economic Development
604	Product Development - Foreign Markets	6.02	Foreign Agricultural Trade and Economic Development
701	Toxic Residues in Food	5.02	Food Safety
702	Protect Food from Toxins	5.02	Food Safety
708	Human Nutrition	5.01	Food and Nutrition
808	Government Programs	6.01	Farm Adjustment, Prices and Income
901	Alleviate Soil, Water and Air Pollution	1.04	Environmental Quality

B. HOLMBORN,
Head of Department,
Governmental Commission on
Research Council Organization,
Sweden

Session III
Part 1
Paper 26

Summary

INFORMATION ON ONGOING RESEARCH AND REGISTRATION OF RESEARCH IN SWEDEN

Collection, organization, registration, and dissemination of information about ongoing research is done in many fields and disciplines in Sweden, and in many cases the work is supported by advanced data processing systems and equipment. More than 200 different catalogues about ongoing research in Sweden are today produced by various government organizations and research institutions. Still, it is not possible to get a quick concise picture of all ongoing R & D in the country.

The question of a more unified registration of the research supported by the government is at present being investigated by a special government commission /forskningsradsutredningen/. Information about research and registration of research is one task for the commission. The main task concerns questions about research policy and research planning.

Different user groups such as scientists and teachers, administrators and politicians, etc. need information about ongoing research. How this information shall be arranged and distributed to the user groups and in which forms a systematic and more coordinated information service about research ought to be constructed are, therefore, main problems. Another problem concerns standardization to get information systems within a country or among countries coordinated to a certain extent. There are today advanced information retrieval systems which satisfy reasonable requirements regarding registration and dissemination of information about ongoing research.

The work in the Swedish commission has for this reason been concentrated on questions about user-needs and the organization of information processing and information services. An activity which processes information about ongoing research obviously cannot be conducted on a large scale in a small country. Co-operation with other information activities and other information-retrieval systems is needed. For this reason the Swedish commission will work in close contact with other ongoing investigations about information, documentation and libraries.

Resume

RENSEIGNEMENTS SUR LES RECHERCHES EN COURS ET LEUR ENREGISTREMENT EN SUEDE

En Suède, le rassemblement, l'organisation, l'enregistrement et la diffusion d'informations sur les recherches en cours sont assurés dans de nombreux domaines souvent grace a des systèmes et du matériel de traitement des données perfectionnés. Plus de 200 catalogues différents sur les recherches en cours en Suède sont établis actuellement par diverses institutions de recherche et organisations publiques. Il n'est cependant pas possible de se faire rapidement une idée concise de la totalité des travaux de R et D en cours dans le pays.

L'établissement d'un mode plus unifié d'enregistrement des recherches soutenues par l'Etat est actuellement étudié par une commission publique spéciale /forskningsradsutredningen/. L'un des domaines examinés par la commission est celui de l'information sur les recherches et de leur enregistrement. Sa tâche principale concerne la politique et la planification de la recherche.

Différents groupes d'utilisateurs /personnel scientifique, enseignants, administrateurs, hommes politiques, etc./ ont besoin d'informations sur les recherches en cours. L'essentiel est donc de déterminer comment organiser cette information et la diffuser auprès des groupes d'utilisateurs et comment édifier un service qui donne des renseignements systématiques et mieux coordonnés sur la recherche. Il faut aussi étudier le problème de la normalisation pour obtenir une certaine coordination des systèmes d'information à l'échelon national ou entre différents pays. Il existe actuellement des systèmes perfectionnés de recherche documentaire qui sont raisonnablement satisfaisants sur le plan de l'enregistrement et de la diffusion des données sur les recherches en cours.

Le travail de la commission suédoise a donc porté essentiellement sur les besoins des usagers et sur l'organisation des services de traitement des données et d'information. Dans un petit pays, il est manifestement impossible de se lancer dans une vaste entreprise de traitement de l'information sur les recherches en cours. Il faut coopérer avec d'autres services d'information et d'autres systèmes de recherche documentaire. C'est pourquoi, la commission suédoise travaillera en liaison étroite avec tous ceux qui mènent actuellement des études sur l'information, la documentation et les bibliothèques.

INFORMATION ON ONGOING RESEARCH AND REGISTRATION OF RESEARCH IN SWEDEN

B. HOLMBORN

Background

Information concerning ongoing research and development /R & D/ work in many subject-fields is available today in Sweden. Catalogues and directories of R & D projects are also issued. For the most part it is the granting and research planning bodies that undertake this registration and information. There is no central registration of R & D projects.

Information concerning ongoing research may differ in its extent and form. It is presented in articles in Swedish and international scientific journals, in unsophisticated newsletters, in project status reports and in R & D surveys covering entire subject-fields. Of a slightly different nature is the brief information contained in registers and catalogues of R & D projects.

References to scientific papers and reports are contained in the documentation systems which exist for certain subject-fields. In Sweden computerized documentation systems exist for selective dissemination of information concerning medicine, chemistry, technology and other research fields.

A recent survey of the production of catalogues and directories of Swedish R & D projects receiving government support showed there to be some 200 such publications. Particulars of R & D projects are also presented in the computerized information systems organized by certain government agencies. The information system on environmental pollution control is one example. One of the data bases of the system, a reference data base, contains particulars of R & D projects, of different types of documents, and of data from investigations in the environmental sphere.

The question of coordinated registration of R & D projects in Sweden has been discussed in several different contexts. The research councils' working group for documentation and information started, in 1966, an investigation of the possibility of central computerized registration of research projects on the pattern of Smithsonian Science Information Exchange in the USA. For various reasons no such registration was instituted. The State Council for Scientific Information and Documentation /SINFDOK/, which is a focus organization for documentation questions, has put forward proposals for a central data base for Swedish technological and scientific reports and projects. The question is now being investigated from the technical aspect, and SINFDOK is supporting the development of an on-line computer system for small data bases. Special attention is being devoted to reduction of the updating costs.

In 1972 the government appointed the Commission on the Organization of Research Councils, of which I am the Assistant Secretary. The Commission has recently presented proposals for a new research council organization in Sweden. Apart from questions of research planning and organization, the Commission is to examine questions of information on research and whether a more coordinated form of R & D registration should be brought about in Sweden. It is expected that the Commission will issue its recommendations during 1976. They will be submitted to the government, which, after examining the proposals, will suggest that parliament take the necessary measures.

The Swedish research structure

In Sweden, the responsibility for planning and support R & D rests to a large extent with delegations, committees and boards, and research councils associated with various ministries. Almost every ministry has special R & D planning and granting bodies in its particular sector. Most research, however, is done at universities and higher educational establishments under the Ministry of Education. The resources for basic research are channeled mostly via five research councils and via the Office of the Chancellor of the Universities, the central authority for the universities and higher educational establishments, all of which come under the Ministry of Education. The total Swedish grants for R & D at present amount to between 3 and 4 thousand million crowns, of which 2,300 million come from the government.

The trend towards sectorization of government R & D activities in Sweden has been particularly marked in the last decade. The sectorial research policy implies that R & D is steered by the goals for the sector and that research activities are judged in relation to other measures within the sector in which the results are mainly utilized.

The sectorization has also had repercussions on the form of the information issued concerning research. A consequence of the pluralism that characterizes the R & D organization in Sweden is the dispersion of the responsibility for registration of and information on research. The problem of integration which arises in the information field owing to the sectorial research policy is one of the questions the Commission must consider when examining the possibility of a more systematic registration of research.

The need for information on projects

To attempt to demonstrate by ordinary user studies the need for and value of an information service which does not yet exist, or which exists only in a rudimentary form, would take very much time and labour. And to present quantifiable needs for different target groups is not feasible, at least for the time being. Another way to get an idea of the need for information on research in progress is to study the extent of the present supply of information and find means for making it more effective. The changes in the research structure may also have repercussions on the need for information, particularly on the need for a survey of ongoing research.

In the parliament and also in conjunction with different investigations, the desire has been expressed for improved project registration, in order,among other reasons, to obtain a better survey of research in progress.

The production of catalogues

In its examination of the production of catalogues in Sweden the Commission found, as already noted, that at least 200 project catalogues and directories of widely varying kinds are issued. The catalogues are directed to different target groups, which means that there must necessarily be some overlapping. But there are also gaps in the coverage, as well as variations in the description of projects. No uniform standard exists. The catalogues, therefore, vary much in appearance, content and form.

Many bodies in Sweden collect information concerning research in progress purely for publication in catalogues or in the form of simple lists. In other cases the catalogues and information constitute a by-product of the registration of applications for R & D grants, which is done by the granting bodies. Through the expansion of sectorial research, the number of producers of catalogues and of registering bodies has increased considerably in recent years. The various producers of catalogues usually collect particulars of projects independently of one another, which is one of the reasons why researchers and research institutions are increasingly bothered with enquiries concerning the work they are engaged on. In order to leave researchers to carry on their work in peace, several institutions have drawn up standardized answers to such enquiries. Even if many catalogues have only a small circulation, the fact that so much work is expended on their production indicates the existence of a need in Sweden for this type of information.

The rationalization which should be possible in the work of collection, registration, and dissemination of information, is one of the main reasons for a more coordinated form of registration in Sweden. The supply of information could be broadened so that the work of collection and registration is not done solely in order to issue one special catalogue.

Structure of research and need for information

The work of planning and coordination which follows from the pluralistic R & D structure accentuates the need for a survey of R & D activities. The increased influence of government, industry and of the general public on R & D in Sweden also means that groups outside the research circle and lacking the researcher's knowledge and contacts will be involved in the planning. A survey of the R & D work being done with grants from different quarters is also a prerequisite for a more open debate on research policy.

A survey of ongoing research is needed at all levels of research planning. This applies in particular perhaps, to a research structure such as Sweden's.

Even in very restricted fields it may be difficult for the individual researcher to keep informed about changes in research solely through his personal contacts. New R & D organs, inter/multidisciplinary concentration of research, and the large number of persons engaged in research make it difficult to obtain a general survey. Information concerning ongoing research is needed in order to be able to decide on a research project and its planning.

In their examination of research projects and in their setting of priorities, the granting bodies must have not only a knowledge of the development of their own projects, but also must be able to survey of projects and the state of individual projects within the research fields of other agencies.

For decisions on research policy it is necessary at the political level to be able to quickly and simply obtain information concerning ongoing research or on trends within entire research fields. Similar needs exist among the groups of laymen who in recent times have more often participated in the debate on research policy.

The Commission on the Organization of Research Councils must consider how the information on research can be disseminated in order to facilitate R & D planning and give an impetus to the continuing debate on research policy, with participation of new groups.

Organization of the registration of research

Another question to be answered by the Commission is whether the sectorial R & D organizations should, as hitherto, have the responsibility for information on ongoing research and registration of research or whether this responsibility should be more centralized.

For a country like Sweden, with only a small share of the world production of R & D, information activities of these kinds cannot be undertaken by an entirely independent organization. The costs would be too high in relation to the expected utilization of the information service. There is nevertheless reason to consider a more centralized registration of research if, for example, the collection, registration and information service can be linked to some other similar activity.

One might consider the coupling of research registration and the dissemination of information on ongoing research to allied fields such as the bibliographical activities of libraries or the collection of statistical data. In Sweden an EDP network is at present being established for library and documentation purposes which will ultimately cover the whole country. The bibliographical work of the scientific libraries - cataloguing, catalogue production, and information retrieval, etc. - is to be integrated through the on-line LIBRIS information system.

The international character of research is well known, and in the international perspective the need for a survey of ongoing research is especially great. The problem of the small country is how to obtain access to R & D information from other countries. But this does not preclude the need for a survey of the research in one's own country. An exchange of information on the international level would require that each country undertakes the responsibility for registration of its own R & D. This is an additional reason for coordinated registration on the national level.

A data base with information on ongoing research may, apart from project data, include personal data concerning those engaged in research. With the relatively restrictive policy adopted in Sweden as regards the registration of personal data, the registration of research may run up against problems of integrity. The requirements of secrecy in respect of commissioned research, e.g. for industry or defence, must also be noted. Secrecy and integrity questions are a matter which will be considered by the Commission.

I have only been able to briefly touch upon some of the main points to be examined by the Commission when considering the possibility of a more coordinated form of registration of ongoing research in Sweden. Without wishing to belittle the importance of other questions of significance, the cost is nevertheless the essential factor when deciding whether the registration of ongoing research can be recommended. But I also would here like to emphasize the importance of indexing and classification questions if a satisfactory quality of information retrieval is to be attained. Finally I would like to draw attention to the questions of standardization which are so important for an international exchange of information.

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Session III

Part 1

Paper 27

Summary

THE ESTABLISHMENT OF A NATIONAL SCIENTIFIC AND TECHNOLOGICAL INFORMATION SYSTEM IN SRI LANKA

A brief preamble on the strategic importance of information on ongoing research in the context of scientific and technological development programmes and social developmental goals is followed by an outline of the major problems met with in current efforts to optimally harness and channel information resources to the user community in Sri Lanka. The need for a national system for the inter-linking and co-ordination of existing resources, systems, and services is stressed.

A review of recent, significant developments in Sri Lanka is made with particular reference to the role of the National Science Council of Sri Lanka /NSC/ - the major governmental organ for the organization of science and technology - as the national focal point for information activity. Recent NSC projects in this field including:

1/ a survey of scientific and technical information resources in Sri Lanka /ongoing/ and

2/ a directory of scientific and technical research projects in Sri Lanka 1970-1973 /published/, are outlined.

Using data collected to date as a basis, the following are described:

a/ specific components of the information stores,

b/ principal user groups and

c/ national expenditure on information activities.

The paper concludes with an outline of the proposed NSC programme for the establishment of the Sri Lanka scientific and technological information centre /SLSTIC/, 1975/79.

Résumé

LA CONSTITUTION D'UN SYSTEME NATIONAL D'INFORMATION SCIENTIFIQUE ET TECHNIQUE A SRI LANKA

Après un bref préambule soulignant l'importance stratégique de l'information sur les recherches en cours pour les programmes de développement scientifique et technologique et la réalisation des objectifs de développement social, l'auteur donne un aperçu des principaux problèmes auxquels on se heurte au Sri Lanka pour répertorier les informations et les diffuser à la communauté des usagers. Elle met l'accent sur la nécessité d'établir un système national pour relier et coordonner les ressources, les systèmes et les services existants.

L'auteur passe en revue les grandes caractéristiques de l'évolution récente au Sri Lanka, et signale tout particulièrement le rôle du National Science Council of Sri Lanka /NSC/ principal service public chargé de l'organisation de la science et de la technologie qui centralise les activités nationales d'information. L'auteur décrit brièvement les récents projets du NSC à cet égard et notamment:

1/ une enquête /encore en cours/ sur les ressources dans le domaine de l'information scientifique et technique au Sri Lanka et

2/ l'établissement d'un répertoire des projets de recherche scientifique et technique au Sri Lanka pour la période 1970-73 /l'ouvrage a été publié/.

Sur la base des données recueillies à ce jour, l'auteur donne une description

a/ des composants spécifiques des systèmes de stockage de l'information,

b/ des principaux groupes d'utilisateurs,

c/ des dépenses nationales pour les activités d'information.

Le document contient, en conclusion, un exposé général du programme prévu par le NSC pour l'établissement d'un centre d'information scientifique et technologique du Sri Lanka /SLSTIC/ pendant la période 1975-1979.

THE ESTABLISHMENT OF A NATIONAL SCIENTIFIC AND TECHNOLOGICAL INFORMATION SYSTEM IN SRI LANKA

V. DE SILVA

I. Preliminary considerations

In Sri Lanka, the need to harness every effort to social and economic developmental goals has led to the formulation of a development strategy in which science and technology play a significant role. To develop and sustain scientific activity at an effective level, an adequate system of auxiliary scientific institutions is a necessity; a national scientific and technological information network is a key component of such a system. Formal recognition of the validity of this is evidenced in a recent governmental decision to establish a national information system. Such a system, if it is to function as a vital input into the economy of the country - deploying scarce resources in the most appropriate directions - must necessarily be geared to developmental objectives and responsive to real needs, both current and projected. A brief review, therefore, of the national developmental programme in relation to the existing S & T infrastructure is apposite.

The development objectives are delineated in the "Five Year Plan,1972/76"[1]; they seek to revitalise the overall economy, an economy characterised by a low level of employment, economic stagnation and an unfavourable balance of payments situation. The economic objective is to achieve a growth in gross domestic production of about 6% per year, and to improve the balance of payments situation; the social objective is to improve standards of living and ameliorate income disparities, particularly in the rural sector. The Plan outlines the areas of special concern to which science and technology can be expected to contribute. In the absence of a national science policy statement, the S & T component of the Plan's proposals assume a further significance as an implicit statement of S & T policy. The key sectors of developmental activity are agriculture and industry. It is in these two sectoral programmes, in the main, that a close correlation is evident between developmental objectives and national programmes for science and technology, particularly in the area of research. Agriculture constitutes the largest productive sector in the economy; it is also the sector with the greatest potential for increase in output in relation to investment input. The emphasis is on measures to increase productivity - in the traditional export sector /tea, rubber and coconut/, in the traditional subsistence crop sector /rice/, as well as in the development of export-oriented minor crops together with diversification of small-scale agriculture /particularly subsidiary food crops and horticultural crops/ on a systematic basis. Sub-sectoral programmes include modernisation of the fishing industry and further development of animal husbandry. In industry, the emphasis is on the utilisation of natural resources - mineral and vegetable, the promotion of agro-based industries, the development of labour intensive technology, improvement of existing technology and expansion of small-scale industry. The Plan also indicates, as part of its social overheads programme, the areas of concern in the fields of health, education, transport and communications. Collectively, the programmes have led to significant developments in the scientific and technological situation. Concomittant with an intensification of efforts in selected "traditional" areas there have also been some new directions in institutional programmes.

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[1] Ceylon. Ministry of Planning and Employment. The five year plan, 1972-76. Colombo, the Ministry, 1971.

Institutional framework: A characteristic feature of the organization of science and technology in Sri Lanka is the dominance by Government; the contribution by the private sector is relatively minimal. The major governmental organizations are the research institutes, the departments, and satutory boards and corporations. Departments are funded directly by Government, while other governmental agencies receive supplementary grants. Government agencies engaged in S & T activities in the various sectors are dispersed under several ministries, but the Ministry of Industries and Scientific Affairs is the ministry deemed responsible for the promotion and co-ordination of research activities and implementation of government policy in scientific matters. The National Science Council of Sri Lanka /NSC/, functioning within the Ministry of Industries and Scientific Affairs as the major governmental organ for the organization of science and technology in the country, is charged with the formulation of a national science policy. The NSC has not, as yet, achieved the desired impact on the S & T infrastructure. However, recent legislation modifying the composition of the Council and clarifying its programme will permit it to act more effectively.

There is a distinct duality in the pattern of current research activity. In the main, mission-oriented research is carried out in the government-sponsored research institutions and the research divisions of other government agencies, while subject-oriented research is carried out mainly in six campuses of the University of Sri Lanka. There is no national science budget and a firm assessment of current expenditure on research is not possible. The latest available figures relate to 1967/68 - the results of a ministry survey [2]. Rs. 22,4 million /25% of gross national product at factor cost for that year/ is given as expenditure on R & D activities. However, the current R & D profile[3] may be considered a reasonable yardstick of the areas of current concern. The R & D intensive fields are found to be primarily the areas of economic profitability. Analysis of the current R & D profile together with a study of the S & T institutional framework provide useful information when assessing the composition of user groups, though more data has to be collected before a national user profile can be constructed.

It is evident that the scientific community will form the chief user group of the proposed information system. But the increasing attention to societal problems and the weight given to qualitative aspects of national growth call for an effective socio-economic information network, one that would interact with the S & T network. Thus, the potential user community will also include such sub-groups as planners, administrators, economists and behavioural scientists.

II. Problem of information transfer

Several factors vitiate efforts to harness recources and channel information to the user community. While the economy, the social situation and the S & T infrastructure have undergone many changes and some development, the information services have remained more or less static. In the main, the difficulties stem from the lack of a co-ordinating mechanism which can promote and direct the information impact. Libraries, information centres and other information stores are dispersed and pluralistic in nature. The lack of co-ordination diffuse the total information impact and diminishes the measure of influence they could well exert. There are different degrees of access and utilisation by the different institutional groups. S & T researchers attached to the university or research institutes have access to facilities which are among the better stocked, equipped and staffed. But the needs of the socio-economic groups are ill-met, for services in their fields of interest are either minimal or lacking; for example, a development information system for administrators, planners and policy makers is an imperative need.

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[2] Survey of Cost of Research and Development, 1968. Colombo Ministry of Scientific Research and Housing, n.d.

[3] NSC Data Base on Ongoing Research.

Problems requiring urgent attention relate to document, financial and manpower resources. An amalgam of many factors restrict document acquisitions and limit coverage. Most of the required documents and data are generated in the developed world, but foreign exchange restrictions limit purchases. Even where an allocation has been made, the total allocation is often not utilised within the grant year, because of processing delays. As there is no rationalisation of acquisition policy, undesirable gaps and duplication occur. As for indigenously generated documents and data, lack of a central depository and inadequate bibliographic control makes tracing difficult, leading to inadvertent duplication of research efforts. As far as manpower is concerned, trained manpower, particularly at the senior management level, is inadequate to service the collections. Facilities of recognised importance are manned by unskilled assistants or short-staffed. Consequently, management is poor. This affects the quality of service and the majority of facilities offer but minimal services - chiefly, loan and reference facilities only. There is also a marked lack of dynamism; passive attitudes stem partly from the lack of incentives - poor wage scales, low administrative status and lack of mobility effect morale. Further, there are no special training facilities in information science available in the country, while provision for training abroad is limited.

Generally, budgetary allocations are inadequate, curtailing both document and equipment purchase. A central body for control and channelling of foreign aid is needed. Certain technical services are not yet available: up-to-date union lists, union catalogue, a national indexing and abstracting service to name but a few, and this factor impedes co-operative efforts and vitiates the free flow of information. These are but some of the problems; there are many more.

The picture, however, is not totally bleak. There is an increasing recognition at the national level by the government, at the institutional level by management, and at the individual level by the scientists, of the utility of an information service. As the necessity to evolve a comprehensive scheme integrating the available infrastructure, attainable resources for development and actural needs has been acknowledged, it is envisaged that a plan for a national information system will be formulated within the next two years. Meanwhile, certain recent developments may be regarded as significant landmarks in the progress towards a co-ordinated system. A brief review of governmental action and the role of the NSC as the focal point for information activities follows.

III. Governmental action and role of NSC

The proposal to establish a National Scientific and Technological Information Centre was first mooted in 1968 and UNESCO, at the country's request, sponsored a consultancy mission in 1968. A report on the establishment of a National Scientific and Technical Documentation Centre was submitted to the Government, and in the following year, the Cabinet approved the proposal to establish such a Centre. Interest in the project was revived with the formal nomination of the NSC as the national focal point for scientific information activity in 1974. This identification of a specific institution as the responsible authority, an authority that can initiate pertinent action, is a significant step towards the strengthening of the national information infrastructure.

The NSC as the authority charged with the formulation of science policy will be responsible for the activation of science information policy. It has a direct commitment in that the proposed National Scientific and Technological Information Centre will function under its aegis. Legislation has been promulgated recently to enable the Council to act more expeditiously, and one of the stated objectives is the establishment and maintenance of a National Scientific and Technological Information Centre.

In 1974, the NSC established a Library and Publications Unit; this year the division has been expanded to include a Scientific and Technological Information Unit. A five-year programme has been drafted, primarily to meet urgent needs for certain basic services. The unit will initially be operated on a modest scale, but its programme is however national in scope and it is envisaged that it will evolve into a fully operative National Scientific and Technological Information Centre.

It is pertinent at this point to refer to four basic data collecting surveys initiated by the NSC. These ongoing projects relate to:

1. Scientific and Technological Potential;
2. Ongoing S & T Research;
3. S & T Information Resources;
4. National Expenditure on Information Activities.

The STP Survey is conducted by the Secretariat and the R & D Survey has been handed over this year to the STI unit, which initiated and currently conducts the Information Resources and National Expenditure studies. The STP survey was successfully fielded to the second stage. Using the data obtained, it is possible to arrive at an overall figure for each field of training. The R & D Survey results have been published in directory form.

The Information Resources Survey is in progress; a representative sample of returns /1st stage output/ reflects some of the problems referred to in Section II. It is planned to complete the Information Resources Survey by the end of this year, to finalise the National Expenditure Survey by 1976 and to field a User Needs Survey in 1976. The three studies, on completion, will yield a sufficient body of information, complemented by the CRD data base, to permit the formulation of a national information policy. The findings will also be used to modify the phased five-year programme of activities drafted by the NSC.

IV. The existing information infrastructure

Attempts to strengthen the national information system through co-ordination of existing sources and services, and the provision of basic services which are now lacking, necessitate an appraisal of the existing infrastructure. The data collected to date through field surveys /Section III/ provide sufficient information for delineation in broad quantitative terms of three major components: a/ the available information stores, b/ principal user groups, and c/ national expenditure on information activities.

Information Stores: Libraries, information centres and other information stores that can feasibly be included in the network of facilities that will be co-ordinated through the National STI Centre number approximately 215. Of these, 51 hold sizable collections. A broad grouping by type and field of interest is given in Table 1. Professionally organized information facilities offering a fair range of services are few. The Technical Library and Information Service of the Ceylon Institute of Scientific and Industrial Research /CISIR/, the Library and Documentation Division of the Industrial Development Board /IDB/, 6 of the campus libraries of the University of Sri Lanka and the National Museum Library /NML/ qualify as "centres of excellence". Five campus libraries cover a multiplicity of subject areas, but one holds a major collection on Engineering and Technology. A substantial natural history collection is held by the NML which is also a national depository of indigenous literature, while the CISIR and the IDB facilities are the two major information institutions serving industry. The libraries of the agricultural research institutes - Coconut Research Institute /CRI/, Tea Research Institute /TRI/, Rubber Research Institute /RRI/ and Central Agricultural Research Institute /CARI/ together with 15 other facilities attached to government bodies operate at a secondary level - budgetary and staff limitations inhibit their information activities. But the subject coverage of their document collections is of particular national significance. 14 other smaller units and 2 recently established information centres make up the remainder of the major group of 45. The 2 new centres are the Trade Information Service of the Export Promotion Secretariat and the Library of the Agrarian Research and Training Institute. The Trade Information Service has begun to operate a national trade information service, while the Agrarian Research and Training Institute Library will gain in importance because of the sphere of the institutional activities: agricultural economics.

It is envisaged that the institutions operating at first level will benefit most from the range of technical services that the National STI Centre will offer. The senior staff of these institutions have the necessary expertise to serve effectively on consultative/monitoring committee and the Centre will rely on them for informed comment. Facilities operating at the secondary level will require active support in the form of grants for equipment and document acquisitions and provision of training facilities. At the tertiary level, there is a plethora of small document stores which will need considerable attention. A detailed review of their activities will have to be undertaken to determine whether their very existence is justifiable in terms of expenditure and services rendered. Centralisation of the collections held and the provision of service points only at these institutions is one possible mode of action.

Principal user groups: Figures available reveal that the total number of persons engaged in S & T activities is approximately 18 573. The QSE component constitutes 5680, i.e. approximately 30% of the total STP. Within the QSE group, Medical and Engineering personnel dominate with approximately 42 and 31% respectively of the QSE component. The balance 27% consists of natural scientists, and social scientists, each approximately 12%; the agricultural scientists constitute the smallest group with but 3% of the QSE.

Total manpower engaged in R & D activities in Sri Lanka in science and technology - excluding the social sciences - numbers 783, i.e. approximately 14% the total STP. Figure 2 shows the number of researchers engaged in ongoing projects in the various sectors of activity. Researchers will undoubtedly form the principal user group of a national information system. Further categorisation by specific areas of activity yield figures indicative of the strength and interests of sub-groups which the national STI services, particularly SDI, will have to match.

The groups are:

		Researchers	
Sector	Activity areas	No.	% of total group
AGRICULTURE		250	34%
	Plantation Agriculture: Tea, rubber and coconut.	85	
	Other Agriculture: Rice, subsidiary food crops /grain, chillies, onions, etc./, horticultural crops, input for agro-based industries /cotton, manioc, etc./	86	
	Irrigation & Land Use: Geology, Hydrology, Soil stabilisation, Land use	25	
	Agricultural economics: Productivity, Marketing and Distribution, Settlement schemes, Cultural practices	14	
	Fisheries: Inland, coastal and deep sea fisheries	23	
	Forestry: Silvicultural research, Timber utilisation and production	05	
	Animal husbandry and Veterinary Science	12	
INDUSTRY:	Ceramics, Oils and fats, Essential oils, Plywood, Industrial microbiology, Food, textile and rubber technology.	104	13%
HEALTH & MEDICINE:	Medical research including Ayurvedic /indigenous/ medicine	203	26%

EXACT & NATURAL SCIENCES: Botany, Chemistry, Entomology, Geology, Microbiology, Physics, Zoology	179	21%
ENGINEERING: Civil, Mechanical and Electrical engineering	22	02%
TRANSPORT: Highways, Rail	16	01,5%
ENVIRONMENT: Town and Country Planning	01	01%
ANCILLARY SERVICES: Microbiological studies, geological surveys and mineral prospecting, information science	08	0,5%

SOCIO-ECONOMIC SECTOR: R & D activities in this sector have not yet been surveyed. At "Agricultural economics" socio-economic studies include behavioural studies relating to levels of acceptance of scientific and technological innovations and the effort of such innovations on indigenous cultural patterns.

National Expenditure on Information Activities: The figures given in Table 2. relate to 36 information facilities; a sample return of facilities so far surveyed. Some of the problems referred to in Section II are reflected in the expenditure pattern.

V. Sri Lanka Scientific and Technological Information Centre /SLSTIC/ - NSC Programme

It is envisaged that SLSTIC will operate at national, regional and international levels. At the national level, it would:

a/ provide a central documentation and information service enabling access to recent and relevant documentation, and fostering the dissemination of scientific and technological, as well as social, economic and operational information; and

b/ promote the inter-linking of existing information institutions into a network of interrelated institutions which can jointly swith information to the community of users - government policy makers, scientists, industrial and agricultural entrepreneurs, etc.

At the regional level, the Sri Lanka Centre would act as the national focus, co-operating in regional information policy development programmes. At the international level, Sri Lanka would be able to participate in and contribute to the World Information System which UNESCO seeks to establish through the UNISIST programme.

Objectives: Long-range objectives and short-term goals have been formulated and the measures to be adopted delineated. In brief the long-range objectives are:

- planning and development of a National Information System for science and technology and specialised sub-systems as may be required;
- development of adequate information stores to meet the requirements of all sectors of the community of users;
- establishment of central documentation and information services for systems within the network for the speedy provision of literature and information;
- promotion of the infrastructure.

Measures: It is pertinent in this brief overview to indicate the key activities the Centre will initiate to implement these objectives.

The development of information stores would entail the establishment of a/ Central Science Library, b/ Data Bank, and c/ Referral Service. The Science Library will concentrate on providing access to documents not held by other libraries in the national network. Emphasis therefore will be on the location and collection of indigenously generated documents, particularly "grey material", the acquisition of supplementary collections of science and technology documentation of foreign origin, and the initiation and maintenance of a comprehensive collection on information technology. The Data Bank will cover scientific, technological, environmental and socio-economic data; the provision of Referral Services, while promoting informal communication within the scientific community, will entail the maintenance of a Registry of specialists who could serve as consultants and disseminators of information.

The Central Services that the Centre would be equipped to offer would include the essential, basic services that such national centres traditionally offer which are beyond the competence or purview of individual libraries;document procurement, selective dissemination of information /SDI/, abstracting, indexing, translation and reprographic services. However, emphasis will be on designing these services to meet specific needs, priority being given to short-term action projects to meet those needs deemed urgent. Sri Lanka, for example, lacks a Union Catalogue of Scientific and Technological Literature. This then is one possible area of priority action. Again, considering the large financial commitments involved, it is expedient that the Centre bear responsibility for subscription to computer-based tape services, promoting the generation of SDI services by specialised information centres.

Promotion of the Infrastructure by the Centre will be achieved through such measures as provision of facilities for education and training in documentation and reproduction; standardization and improvement of information handling facilities as, for example, the development of internationally compatible national standards in documentation and transfer of information technology; and the promotion of information consciousness among the user community and provision of training in the use of information resources. Measures to promote national and international co-operation will include:

a/ Promotion of co-operative acquisition of foreign information resources to ensure that there is in the country at least one accessible copy of every worthwhile scientific publication for the use of the scientific community.

b/ Co-operation with national and international organizations engaged in information and related services.

Table 1. SCIENTIFIC AND TECHNOLOGICAL LIBRARIES AND INFORMATION CENTRES IN SRI LANKA

TYPES	Grand total	Major group	Mission oriented				Discipline oriented		
			Agric.	Industry	Health	Socio-econ. studies	Exact & Natural Sciences	Technology	Socio-econ. studies
1. Special	52	30	12	9	2	24	2	1	2
2. Academic: University & College	23	10	-	-	-	-	8	10	5
3. National	2	2	all fields re national literature						
4. Documentation Centres	2	1	-	1	-	1	-	-	-
5. Societies & Assoc.	9	2	-	-	1	3	1	1	3
6. Public	6	6	all fields						
7. Govt Inf. stores	118	-	6	47	3	61	-	-	1
8. Other Inf. stores	3	-	-	-	-	3	-	-	-
TOTAL	215	51	18	57	6	92	11	12	11

Source: Survey of S & T Information Resources in Sri Lanka, National Science Council, in progress.

Table 2. STATISTICAL SUMMARY OF EXPENDITURE: 1974
/Sample return from 36 facilities only/

Type of Expenditure	Local Currency	%
Total expenditure	2 243 049	100
Acquisitions	1 436 012	64
Books	705 092	49
Periodicals	726 631	50
Other	4 289	1
Manpower	807 037	36
Professionals at all levels	737 766	91
Supporting staff	69 271	9

DISCUSSION, Session III, Part 1.

Moderator: E. SAVOVA,
Director,
Central Library,
Bulgarian Academy of Science

Discussion of the paper by S. BHAGAVANTAM

M. TEJEDA: Would you consider that the lack of information in the developing countries is due to the low level of scientific activity?

S. BHAGAVANTAM: A uniform answer cannot be given to that. I think it depends upon the nature of the country and the state of development. The answer would be yes in the case of several very underdeveloped countries.

W. FOSTER: One of the purposes of a current research effort information system would be to allow scientists to learn of work that is similar to their own in the hope that this would promote some sort of interaction. I am wondering what you think the possibilities are of scientists in developing countries working jointly with scientists from developed countries, in the common pursuit of research - what are the opportunities for travel, for correspondence, for common research facilities to be made available or for the exchange of equipment, the kinds of things that a research information system might encourage?

S. BHAGAVANTAM: The committee of which I am chairman, is very much concerned with providing opportunities, both in time and in finance, for scientists from developing countries to travel, visit, develop personal contacts and work in developed countries. This is necessary and we should devise methods and ways.

S. SCHWARZ: I would like to come back to a question I tried to raise yesterday without any response, namely the following: There is in the context of new research always some dissent in the research community, whether the result is really valid or not. Now if you are in the game you will know if new things are applicable or not, but if you are not in the game and you just get a piece of information you can't really evaluate it in a larger context. Now, these centres about which there is much talk at this conference, would give people these pieces of information on what is going on but not the context and if you want to give the context this becomes a much bigger problem really because then you have to evaluate the whole thing every time you give a piece of information. Has any thought been given to this, when demands are made for this kind of information?

A. ALMASHAT: My idea about the centres is to have, not all the information about research, but some abstracts of the research being carried on. If you want to have all the information set in the centre, you will need a very large capacity for storing the information which is not available in the developing countries.

M. EL HADI: The idea of establishing centres whether they are national, regional or international, I think, this is a premature idea right now because we are suffering from a hierarchy of existing bodies which cost the developing countries a great deal. But the idea which could be implemented with the developing countries - is how we can co-ordinate the existing resources instead of creating new ones.

H. ARNTZ: This may be more a remark than a question. In the last two papers we heard, one aspect was missing: that is the need for better education of the users in the developing countries. We found in many cases that excellent collections exist but not in the traditional libraries. Collections of material of high value for research workers exist for example in ministries or branch offices of the Bank of International Development and others but they are completely unknown to the research community whereas these institutions were prepared to admit access to their collections, to persons from recognized institutions like universities. I think this must be considered when we speak of the needs in developing countries.

Note: Due to the time limit, the other papers were not discussed.

PANEL DISCUSSION

PROBLEMS AND METHODS IN MEETING USER NEEDS

DISCUSSION DE GROUPE

COMMENT SATISFAIRE LES BESOIN DES UTILISATEURS: PROBLEMES ET SOLUTIONS

Moderator: Y.DE HEMPTINNE,
Director,
Division of Science and
Technology Policies,
UNESCO

Members: J.H. SCHNEIDER
D. SENE
J.C. CREASEY
C. VERNIMB
G. ROZSA

Y. DE HEMPTINNE: I am very happy to be your Moderator this afternoon and I am sure that the discussions will be lively, and without any further formalities I would ask whether there are any questions from the floor?

A. MENDEZ: Monsieur le Président, ma question semblerait inopportune, mais je trouve que cette assemblée n'a pas considéré avec assez d'attention une voie de communication qui me semble essentielle pour l'information - je pense a la communication non formelle et a la facon de créer des réseaux de communications non formelles entre les chercheurs. Le Professeur WESTRUM a parlé hier de la possibilité de créer des liens entre les chercheurs, un autre participant a aussi parlé de la possibilité de créer des réseaux comme il existe en Union Soviétique et au Royaume-Uni. Aujourd'hui, Mr. SAMAHA, nous a dit que sur 45 chercheurs interrogés dans son pays, le Liban, 17 considéraient l'inventaire sur les recherches en cours comme un moyen pour établir des communications directes, et cet aprés-midi, M. BHAGAVANTAM nous a parlé aussi de l'isolement du scientifique, les contacts personnels devenant extrêmement rares. Mon expérience comme scientifique de l'information dans un institut de recherche me permet de dire que cette question est assez importante pour qu'on lui accorde plus d'attention dans une assemblée de spécialistes comme celle-ci.

J. CREASEY: These are wide-ranging questions and I think there are some very valid points here. The invisible college, as it is normally called, the informal contacts will always go on and will always be valuable but I think that what was suggested by the questioner is to seek some formal framework into which one can put such contacts. It seems to me that one of the frameworks which is already emerging, which could answer many of the problems and needs that have been raised so far in this symposium, is the international referral system operated under the United Nations Environmental Programme. This idea came up at the United Nations Conference held in Stockholm in 1972 and during the past few years a great deal of work has gone on. The philosophy behind it was simply a reverse of what had happened over the past two decades and that is: to make the fullest possible use of resources as they exist in the countries instead of setting up big, costly, complex, international documentation centres. In accordance with that, the USA recently set up their own focal point and the United Kingdom is setting up its own for the beginning of the year. I understand that the main points of this system are something like these: it is a worldwide system or framework, that operates at different levels: national focal points with subject focal points within the countries, regional focal points and the headquarters centre in Nairobi in East Africa. The subject areas covered by this system could be bound up in the phrase: environmental information. I think this is the answer to how to develop information contacts within a formal framework.

D. SENE: Je voudrais préciser qu'il n'y a pas d'opposition entre un systeme disons officiel d'information et un systeme nonformel d'information, et qu'il y a plutôt une complémentarité. Je crois qu'il faut plutôt raisonner dans ce sens.

S. PASSMAN: Along the lines of the previous question about the formal communication, I wonder if we could have a bit of discussion concerning what one might refer to as, the sociology of science and, in particular, the way in which scientists might feel about interacting with their colleagues prior to the time they have published and thereby placed their claim for priority on their contribution. I think that there may be different points of view here, points of view of the government who can take steps to see that research grants are registered in an information system and who will wish to see that their resources are used efficiently and that research is not duplicated. I think that the question of proprietary involvement of research may cause some difficulties with regard to the interaction of research people at a fairly early phase. We have all probably read Dr. WATSON's "The Double Helix" and have understood the race aspects, the rivalry and so forth in research. I myself think this is not an insurmountable problem, but I think it should be raised in connection with any kind of information system dealing with the registry of current research efforts and I wonder how the panel members feel about this point.

J. SCHNEIDER: I think that scientists in general are very eager to exchange information and to get together. "The Double Helix" that you mentioned is an unusual case, a very hot field where everyone is racing for what they know will be the Nobel Prize. I think that in most areas of research, people are eager to know who else is working in the field, to contact them and discuss their methods and compare approaches and for this reason I think that, as was discussed earlier, you need complimentary systems. The information systems that we are talking about here, are very useful tools for bringing people together and letting them know what is going on. I don't think it is sufficient to produce large listings or to sit there as a passive organization waiting for somebody to come and say who else is working in my field because many people don't even know that these systems exist. Instead, I think the systems have to play a very active role, they have to make every effort to disseminate the information that they collect and make sure that the people are put in touch with each other. In the cancer area, if I might just make a point about something we have hit upon as a method for doing this, we have planned to produce a series of approximately 100 special listings of research in very narrow areas, which we will send free to everyone who is listed in each document.In this way, we hope that they will be brought together and that they will communicate with each other and I think, in many cases, if they are working in a similar area, they will. I don't believe that the competition,which you raised, does exist in the cancer area at least.

H. HOGEWEG-DE-HAART: Don't you think that scientists won't mention their projects to the register before they know that there is something coming out of their research. Probably also, they would have made a preliminary publication or even a claim on their research so that they will not fear anyone's competition in the race aspect mentioned by Mr.PASSMAN.

S. SCHWARZ: I could claim the opposite because it's not very easy to say what is a fruitful idea and you can't easily tell when you have got a result. So when you evaluate later on and try to make the history of a certain project, let's say the DNA business, it is not easy to say when the whole thing started or originated really. Scientists are in fact very cautious about giving away their ideas until they really have the priority, this is the real problem. I think these registers we are talking about may come to be so general that one can't really identify what people are doing, one can identify only the area, which may be a good thing in itself for making contacts, but you shouldn't hope too much of really getting a push in your own work from it.

J.E. BROWN: I think we are really talking about research projects that are recognized, that are underway; rather than research that a scientist is beaming up on his own and experimenting with. It seems to me, maybe we are talking about two different things.

E. SAMAHA: We discussed yesterday a part of this problem. There are two points. First, I think that the percentage of such hot topics is small compared to the whole number of projects. Secondly, although some of the projects are confidential, if the investigator needs money, he has to obtain this from a financial agency and therefore he has to submit his project. The secrecy is not secrecy anymore in the full sense because a few people will know and sometimes experts in the field will be consulted for evaluation of the projects.

D. SENE: C'est un sujet évidemment tres délicat dans lequel il faut avoir l'esprit un peu froid et essayer de voir le probleme sur différents plans. Les réactions peuvent différer s'il s'agit de recherche fondamentale ou de recherche appliquée, s'il s'agit du secteur public ou du secteur privé. En ce qui concerne la recherche fondamentale, qui est surtout destinée a une amélioration de la connaissance scientifique, c'est en général une recherche presque a fond perdu effectuée souvent grace à des fonds publics. Sur ce plan là les chercheurs acceptent souvent de diffuser les sujets de recherche parce que ce sont des domaines où des discussions sont toujours fructueuses et où il n'y a pas de risques a dévoiler les projets. De meme, en ce qui concerne la recherche appliquée publique, il n'y a pas de secret et la publication est assez facile. Par contre, dans le secteur industriel, le secteur privé, ces recherches appliquées peuvent avoir des répercussions très importantes dans le domaine économique, et c'est la que la regle du secret peut jouer.

G. RÓZSA: Je crois qu'on peut distinguer deux types de secrets: il y a un secret de prestige qui joue entre les chercheurs et il y a un secret économique, militaire ou administratif, qui est illusoire parce qu'il n'existe aucune recherche sérieuse pouvant etre commencée n'importe où sans qu'il y ait un projet bien déterminé exigeant un financement, alors là il n'y a plus de secret car il y a toujours un pouvoir politique ou administratif qui décide en connaissance de cause. Je crois que c'est l'aspect psychologique et sociologique de la question posée par Mr.PASSMAN, qu'il faut considérer. Il s'agit du secret de concurrence, de compétition et de prestige parmi les chercheurs et ce n'est pas du tout dangereux à mon avis.

A. NEELAMEGHAN: For some years I have been providing information to a group of people who were working in a very narrow field, such as the one mentioned by Dr. SCHNEIDER. That is, in the field of antibiotics research - isolation of new antibiotics, and I have found generally that they don't disclose what they are working on until they get stuck on a problem, such as, for example, they do not know how to purify a product further or that they have a certain spectrum which they are not able to interpret etc.Only when they require further advice from more knowledgeable people - they ask the information division: do you know people who are involved in this kind of work so that we can contact them? Until then, they keep the thing to themselves. We have also noted that younger scientists usually do not contact their peers directly, either because they may not know who they are or because they prefer to get the advice from their directors or project leaders as to the proper persons to get in touch with.

E. DE GROLIER: Je crois qu'il y a un probleme un peu connexe mais assez différent qui est celui du contact entre les chercheurs fondamentaux et les chercheurs d'application et particulierement dans l'industrie. Un industriel peut avoir un probleme qu'il ne sait pas comment résoudre, il a besoin de chercheurs plus fondamentaux pour l'aider à cela. En France il y a quelques expériences dans ce domaine, en particulier le CNRS a crée un bureau spécial pour mettre en contact les industriels avec les laboratoires du CNRS susceptibles de les aider. La personne chargée de service de contact utilise sa connaissance

personnelle des laboratoires du CNRS ainsi que les répertoires des recherches en cours du CNRS. Donc, il n'y a pas d'antagonisme entre un service destiné à faciliter les contacts personnels et un service enregistrant au fur et a mesure les travaux des chercheurs. Maintenant on peut se dire: ca c'est possible dans un pays, mais est-ce possible dans le transfert international de technologie? C'est un autre probleme que M. DE HEMPTINNE connait bien puisqu'on l'a évoqué a propos de l'Afrique, a propos de l'organisation destinée a venir en aide aux pays africains au point de vue de la recherche. Je pense, par exemple a un chercheur au Maroc ou au Sénégal, comment peut-il savoir quels sont les laboratoires en Europe ou aux Etats-Unis qui pourraient l'aider à résoudre une question déterminée, alors la, je ne sais comment organiser ce transfert international de connaissances sur les spécialités, serait-ce par les biais de bureaux nationaux à l'image du bureau national qui existe en France?

Quant aux chercheurs de pointe, je crois qu'ils ne nous ont pas attendus. Ils se connaissent, ils sont en contact les uns avec les autres, en participant a des colloques, en se visitant, en échangeant des rapports de recherche, des lettres ou des télégrammes; ceux-là n'ont pas besoin de nous. Mais je pense à tous les autres qui ont besoin de ce transfert de connaissances et de technologie et en particulier, dans les pays en voie de développement. C'est la que doivent porter les efforts, et en particulier, ceux d'une organisation comme l'UNESCO.

Y. DE HEMPTINNE: Je vous remercie beaucoup, M. DE GROLIER, Je crois que votre intervention a été tres intéressante et la derniere partie me laisse tout de même un peu rêveur, car les statistiques de l'UNESCO montrent, que dans le monde il y a actuellement plus de 3 millions de chercheurs a plein temps, et on voit mal comment chacun d'eux pourrait vraiment etre conscient des travaux que font les autres. Il y a quelques grands patrons qui connaissent quelques autres grands patrons et je crois qu'on ne peut pas aller au dela, meme cette situation qui reflete plutot l'avant-guerre est en voie d'etre rapidement dépassée par les évenements, mais enfin, peut-etre avez-vous raison et que je sous-estime ces "invisible colleges" qui existent apres tout.

E. DE GROLIER: Dans des domaines de pointe comme, par exemple, les recherches sur le sommeil ou sur la transplantation d'organes on voit des articles qui disent que les spécialistes se connaissent entre eux. Donc il y a finalement un petit nombre de spécialistes qui arrivent a se connaître et il y a aussi le phenomene des "gate-keeper", des personnalités qui dans différents pays servent de ponts entre les équipes, mais il y a aussi des équipes qui ne se connaissent pas. J'ai été frappé en lisant les journaux a propos de KANTOROVITCH qui a reçu le prix Nobel d'Economie, de savoir qu'il a mis 20 ans a connaître le nom de son homologue aux Etats-Unis qui faisait exactement les memes travaux et qu'il ne connaissait pas. Il y a là un manque de communication certain. Maintenant, je crois que dans une assemblée comme celle-ci, on ne peut pas trouver des solutions, mais on peut peut-être poser simplement le probleme et regarder ce qu'on peut faire. Personnellement, je vois la solution dans la constitution à l'échelon national des bureaux tels qu'il en existe en France, et peut-être aussi ailleurs, Un chercheur, disons de Sri Lanka ou de Sénégal, pourrait s'adresser a une organisation comme l'UNESCO qui lui indiquerait l'organisme national où il peut espérer trouver quelque chose. Par exemple, on sait qu'il existe une unité de recherche sur le sommeil en France, a Lyon, par conséquent on peut s'adresser au CNRS pour savoir qui c'est; on sait qu'il existe des unités sur la transplantation d'organes dans tel ou tel pays, ils ne sont pas tellement nombreux, on peut signaler a la personne deux ou trois centres nationaux qui pourraient l'orienter vers les laboratoires les plus indiqués.

Y.DE HEMPTINNE: Une simple question, M. DE GROLIER: Est-ce que le bureau francais couvre seulement le CNRS ou est-ce qu'il couvre toute la recherche en France?

E. DE GROLIER: Pour l'instant seulement le CNRS, malheureusement. C'est un défaut du bureau francais, mais enfin c'est déja quelque chose, le CNRS représente quand même 75-80% de la recherche fondamentale francaise.

S. SCHWARZ: Just a little question to Mr. DE GROLIER: Isn't this a typical example of how you could much better acquire the information? You could identify immediately the scientists, the institutions and their addresses and you go then directly without any intervention, intermediates or advisors?

J. SCHNEIDER: There is another partial solution to the problem that Mr. DE GROLIER has raised. - That is to set up international systems in many different subject areas. One of the reasons, I guess, I am part of the Panel, is because we are trying to do this in the cancer area, where we have an international system for collecting information on cancer from all the countries in the world and distributing it to all these countries. So here, in a specific subject area, we hope to solve exactly the sort of problem you raise. Now, you can imagine the problems and I am sure many others are doing the same in other subject areas.

M. MENOU: Je voudrais attirer l'attention de l'assistance sur des problemes plus triviaux: a supposer qu'il existe des bureaux nationaux et un système de liaison international entre ces bureaux, qui donne accès aux listes de chercheurs ou d'institutions, je me demande quelle est la probabilité pour un chercheur d'un pays en voie de développement plus ou moins inconnu de son interlocuteur étranger d'obtenir une réponse? Je crois que les expériences que nous avons eues les uns et les autres dans ce domaine étaient plutôt fâcheuses, pour le moins qu'on puisse dire. Un autre problème non moins trivial est celui du temps que mettra la lettre ou l'autre moyen de communication et son coût? Ne pourrait-on pas considérer une formule qui favoriserait les communications au lieu de les gêner comme c'est le cas actuellement où, par exemple, les tarifs postaux sont discriminatoires entre les pays en voie de développement et les pays développés qui sont les principales sources d'information scientifique et technique.

E. DE GROLIER: Je crois quand même qu'il y a quelque chose d'effrayant. Le représentant de la Suède nous a dit qu'il y avait 200 catalogues en Suède - il est bien évident que quelqu'un qui n'est pas en Suède ne peut pas se débrouiller avec cette masse d'informations. Par conséquent, il faut qu'il y ait sur le plan national en Suède quelqu'un qui puisse lui dire auquel de ces 200 catalogues il peut se référer. Pour répondre à l'idée sur MEDLARS, c'est vrai, comme d'ailleurs pour les autres systèmes, on peut utiliser par exemple "Science Citation Index" et voir les gens qui sont les plus cités dans tel ou tel domaine, mais je crois qu'il ne faudrait pas se borner à une solution, car il n'y a pas qu'une solution, il y en a toute une série, et peut-être ce serait le rôle de l'UNESCO une fois cette conférence passée que d'examiner l'ensemble des solutions possibles. Quant à ce qu'a dit M. MENOU, c'est tout à fait vrai, il y a un moyen très rapide d'obtenir des information, c'est le TELEX, à condition que les tarifs ne soient pas prohibitifs.

D. SENE: Je voulais seulement dire qu'il serait souhaitable que les liaisons se fassent entre les systèmes nationaux et les systèmes internationaux ; car pour un chercheur isolé dans un pays déterminé il est souvent difficile de se mettre en rapport directement avec ces systèmes internationaux, c'est le systeme national qui lui assurera la liaison.

H. BUNTROCK: I would like to come back with one short remark to what Mr. PASSMAN said previously: that there might be a certain reluctance on the part of the research workers to release the information to inventories on ongoing research. The reasons may be very complex and may be very trivial, for example: that investigators do not find the time to fill in the forms, or they might be afraid to let other people know the sources of their funds. For this reason, I suppose that the referral system is a first approach and a quite acceptable solution, because in this case the research workers and/or the national centres would keep a certain control over the information which they might give away later on request. In the European Communities, we have launched in a specific limited field, another approach, and this is to compile review articles on growing points in a very limited field of research in order to encourage the mutual co-operation between research workers in a given area and in a given field. We do not yet have results of this new project but this may be another approach.

H. ARNTZ: Since some of the previous speakers have said that they were dealing with trivial questions I will do the same in speaking about the interconnection between the information centres in the so-called developed and developing countries. In our countries it is normal that people who need information in any research field are served by people who have the same profession, a user profile of an engineer can only be understood and served by somebody who is an engineer himself, because the specialized research of today can be understood only by those who have themselves a knowledge of the profession in question. Now, in the developing countries where we train information personnel and documentalists, we always have the same problem, that the number of academic graduates in a given profession is so small, that these countries cannot afford to use them in information centres. This is a real problem for meeting user needs in developing countries.

Y.DE HEMPTINNE: I remind you, Ladies and Gentlemen, that we are now in a Panel discussion specially devoted to the problems of user needs and the solutions that are envisaged to cope with these needs, so I would invite questions from the floor to our panelists, which are focused on user needs, problems and solutions.

Mr. RAMPACHER: I would like to address this question to anyone on the panel or anyone in the audience: Have you investigated in your country a kind of user profile empirically, and how often do you think such a user profile should be investigated, every two years, three years?

J. SCHNEIDER: I think that some of the people from the floor and perhaps on the panel said earlier, that it is highly desirable to integrate the information on ongoing research projects into already existing SDI systems. Whenever the user's profile is entered, he would receive simultaneously the information about published literature and about research in progress. Again this is something that we have built into the cancer system where we are trying to integrate these two types of information because we feel that they form together, a complete picture and that either one alone is only a part of the information that the user needs. Is that at all an answer to your question?

Mr. RAMPACHER: Yes, it answers part of it, but maybe the research workers in cancer research are very highly motivated. I am not quite sure whether the research workers in other disciplines are motivated as much. The other point is: I think that an existing information system will bring out new information needs and therefore it is necessary to ask the potential users not only the users you really have, how the information should be built up.

D. SENE: Certes, les chercheurs sont des utilisateurs privilégiés des recherches en cours, mais il ne faut pas oublier les responsables de la politique scientifique et également les décideurs en matière de développement. Le problème qui peut se poser à ces responsables est de savoir d'abord quelles sont les recherches qui doivent être conduites pour résoudre des problèmes de développement, ensuite si ces recherches sont entreprises dans des situations analogues à celles du pays, est-il nécessaire d'entreprendre ces mêmes recherches? Mais pour cela il est absolument indispensable de savoir s'ils peuvent obtenir les résultats de ces recherches entreprises ailleurs. Tout le problème qui se pose donc pour ces gens de la politique scientifique est de savoir si l'information sur les thèmes de recherche peut être suivie par une information sur les résultats. Le même raisonnement s'applique en ce qui concerne les responsables du développement, - un programme peut avoir un intérêt scientifique mais ne pas avoir un impact pour le développement, or ce qui importe avant tout pour ces responsables est cet impact. Pour répondre à la question soulevée par l'orateur précédent, je pense qu'il faut considérer trois types de profils d'utilisâteurs: le profil du chercheur lié surtout à l'interêt scientifique; le profil du planificateur lié à l'intérêt scientifique, mais aussi à la répartition des ressources; et le profil du développeur axé surtout sur les problèmes d'utilisation des résultats de la recherche. Le tout est de savoir si, dans les informations que nous pouvons transmettre, on peut répondre a ces trois catégories de profils

C. VERNIMB: When I listened to the papers presented yesterday and today, I got the impression that the information systems on ongoing research described were mainly developed for the use of the sponsors, for the purpose of decision-making and for control and statistics. If we consider the benefits for the whole society, then the needs of the scientists and technicians performing the research are to be taken into account more than it is until now. These users need the information on ongoing research just as they need information on normal publications in order to avoid duplication. As a consequence, for retrieval, the information on ongoing research should be indexed in the same way as normal publications in a given subject field. In other words, it should be possible to use, in principal, the same subject-oriented information system for publications and projects. Sponsors can also benefit from this, since by having acces to such a system containing publications and projects, they will avoid sponsoring obsolete projects.

Y. DE HEMPTINNE: It occurred to us in the Unesco Science and Technology Policy Division that the indexing of literature in this field could also cover the indexing of research projects, at least with a certain coarseness, and we have developed for that purpose a thesaurus which includes about 9000 concepts or descriptors and which will be published in about three or four months time.

I. WESLEY-TANASKOVIC: You have just raised the question that I had in mind. When we speak in the context of meeting user needs, then of course, our experiences and what we have had here, the realizations already of these ongoing research projects in different countries, have clearly shown and reflected the user needs. We have seen that most of the recently developed ongoing research information systems have been within the administration of science or within the science and technical information systems, as a part of the reference services: who is doing what and where? and we have just now mentioned that this activity might be considered also as part of the scientific endeavour as a communication not only of information but of concepts and ideas between the scientists, although Prof. WESTRUM mentioned on the first day, we did not discuss very much of this side of the problem. Now I would just like to raise a question: Is the ongoing research information system a special system of its own? Is it a subsystem of the science and technical information system? or should it be developed as an instrument of science policy? or should it be more developed as a part of the scientific endeavour of the scientific communities? I am raising this question because of how to follow up this conference and to follow up in this way not only on the national level but also on the international level and especially within UNESCO which is considering science and the development of science, science policy research and information.

G. RÓZSA: La question est très juste et vraiment très urgente à savoir à quoi va aboutir cette conférence: est-ce qu'on veut vraiment créer un nouveau système d'information sur les recherches en cours, ou bien utiliser soit les systèmes déjà existants soit les systèmes en cours d'être lancés. Je ne peux qu'exprimer ici mon avis personnel qui est le suivant: il y a à peine dix jours, les experts gouvernementaux ont discuté à l'UNESCO le lancement du systeme SPINES /Science Policy Information System/. Je pense qu'il est utile de vous donner certaines informations à ce sujet. Des experts gouvernementaux ont recommandé au Directeur général d'inclure dans le programme et budget de l'UNESCO pour 1977-78 le lancement du systeme SPINES. Ce système vise à un échange volontaire d'informations en matière de politique scientifique parmi les Etats membres de l'UNESCO. C'est une contribution volontaire, avec un "input" décentralisé, et un "out-put" centralisé par une sorte de "central processing group". Or, pour ce systeme SPINES, on a fait des travaux préparatoires depuis au moins quatre ou cinq ans. On a recueilli pas mal d'expériences qui ont abouti, entre autre, au développement du "Thesaurus de SPINES" qui contient, comme M. de HEMPTINNE venait de dire, approximativement 9000 notions. Selon mes connaissances et en comparaison avec les autres thesauri existant en matière de développement économique et social, on peut dire que le thesaurus de SPINES est, le moins qu'on puisse dire, un des mieux élaborés et pourrait être utilisé pour le développement scientifique et technologique. L'expérience finale montrera les avantages et les inconvénients du thesaurus. Pour résumer et pour essayer de donner une réponse à la question posée par Mme WESLEY, à mon avis, ce serait un gaspillage des efforts intellectuels et professionnels que

de concevoir un système tout à fait nouveau pour l'échange d'informations sur les recherches en cours; il serait plus rationnel et plus économique de consigner les efforts de cette réunion et d'autres qui vont sans doute suivre, avec le système SPINES qui est sur le point d'être lancé et de voir dans quelle mesure SPINES pourrait couvrir les besoins de l'information en matière de recherches en cours.

D. HERSEY: The question has been raised here about the need or the desire for some kind of central international organization which would collect information on all the ongoing research all over the world. It seems to me that, in terms of exchange of information between countries, it would be probably more logical and feasible and certainly not an expensive operation to deal independently with countries for certain data where they have an interest. It is also possible to consider the development of international systems for specialized subject areas like energy, environmental research, cancer, etc. But I would suggest that this matter raised by the comments of Mrs. WESLEY, Mr. ROZSA and others be left for tomorrow's session which is going to deal with this international aspect.

E. SAMAHA: Comme vous l'avez signalé tout à l'heure, le but de ce débat est: "comment satisfaire les besoins des utilisateurs, problèmes et solutions". Nous avons entendu quelques exposés où il a été question d'enquêtes auprès des utilisateurs, mais je ne crois pas que dans les différents pays on ait fait suffisamment d'efforts pour comprendre les besoins réels des utilisateurs. Il m'a semblé que dans les pays les plus développés, on a eu surtout recours à la collecte de l'information auprès des agences de financement, ce qui a mis les utilisateurs et en même temps les fournisseurs un peu à l'écart. On ne les a pas fait participer activement au système pour qu'ils puissent y adhérer entièrement, et là je crois qu'il y a du travail à faire dans les divers pays pour bien comprendre quelle est la relation à faire entre les systèmes et les utilisateurs et/ou fournisseurs de cette information. J'ai signalé ce matin notre expérience au Liban à ce sujet, où il a paru y avoir une certaine contradiction puisque le manque d'empressement des chercheurs à remplir le questionnaire ne réflétait pas le besoin perçu par eux pour le répertoire et qu'il y avait une sorte de déphasage a ce sujet; c'est pourquoi je suggère une recommendation aux divers pays pour faire un effort supplémentaire afin de mieux comprendre les besoins des utilisateurs à ce sujet et pour associer plus activement les chercheurs au développement de ces systèmes d'information sur les recherches en cours.

D. SENE: Tout à l'heure j'avais évoqué l'existance de trois séries d'utilisateurs, à savoir les chercheurs, les développeurs et les responsables de politique scientifique. Pour satisfaire les besoins de ces utilisateurs il me paraît utile de compléter les informations sur les recherches en cours par les informations sur les résultats de ces recherches, ou tout au moins sur la possibilité de les avoir sur demande. Je ne sais pas maintenant par quel système; c'est à trouver.

Mr. BICHAT: Mon intervention vient compléter ce que vient de dire Mr. SENE, en ce sens que les besoins des utilisateurs, qu'ils soient des chercheurs, des développeurs ou bien des responsables gouvernementaux, sont finalement, je crois, moins différents qu'il n'apparaît à première vue. Il est évident que pour les chefs d'entreprise ou bien pour des responsables administratifs, les répertoires des recherches en cours sont des documents trop importants pour pouvoir être consultés et qu'il est nécessaire de rédiger des synthèses, de travailler l'output de ces informations pour les mettre facilement à leur disposition. Mais mon expérience montre que ce travail de l'output est au moins aussi important pour les chercheurs. En effet, si on prend n'importe quelle discipline scientifique et que l'on voit les répertoires produits, on se rend compte que n'importe quel chercheur dans un pays développé ou dans un pays en voie de développement, est incapable de prendre connaissance de la littérature mondiale dans la discipline qui le concerne, et il me semble qu'un énorme travail est à faire pour travailler les informations contenues dans les répertoires, afin de les mettre à la disposition des personnes qui en ont besoin.

J. SCHNEIDER: I think you have just raised a very important point that has been emphasized many times but I would just like to re-emphasize, that the information must really be analysed, as someone pointed out, someone who knows the subject very thoroughly and can take the project and put it into exactly the categories that from the users point of view are going to be most useful. For that purpose, a hierarchical or multi-level classification, is of tremendous importance. If I could also speak on Mr. SAMAHA's point about the need for motivation of the users both in terms of contribution and of use of the system. I think, to motivate the user to contribute to the system, one has to supply him with something in return. Systems that only take information from him by sending out a form and getting a reply are not going to be as successful as those where you make sure that everyone who contributes to the system is supplied with documents that his information has been put to use. If you can isolate the areas in which each person is working and make sure that the people who are working in that area get all the projects that are in the area, in a narrow subject way, this would be one of the most useful products to motivate the users. In terms of contribution, one point that has not been really discussed adequately here at this meeting, is the need for very heavy publicity on the availability of the system, to encourage people to use it. So much money goes into the collection and processing of information and it seems that quite a significant part of the budget might reasonably be spent on publicizing the availability. I think that this is one of the areas where many of the systems are not as active as they could be.

J. CREASEY: Mr. SCHNEIDER, in fact, has made the points actually and perhaps I could quickly skate around them. First of all, it is extremely important to find out more precisely what our users and potential users really do want, and in the U.K. we need to do more in this area. At the moment we have been doing this by taking every opportunity to monitor their wishes when they phone up, when they write in, noting the comments that they make, sending out very well worded and specific questionnaires. We have also tried to analyze the requests sent to us, about five hundred a month, by noting the requesting organization and the type of the user, whether he is an administrator, policy-maker or research worker. It does lead me on to the point that Mr. SCHNEIDER made on the value of publicity, the value of publications which can be underplayed, I think. Concerning the size of the publication where you have thousands of projects, there are ways of limiting it, for example, by the subject grouping, by the level of entry, by short title entry for example, instead of full abstract. Now, I like to think that, with good publicity, your publication will be available in several thousand independent terminals or in several thousand referral points. Admittedly one doesn't always know whether the volume you have sent out is gathering dust on the shelves of a library in some institution, but eventually one will find out. In fact, we do get a lot of very good analysis coming back to us, analysis based on the volumes that we had distributed.

J. SCHNEIDER: To worry about the volumes gathering dust on library shelves reinforces a point I made earlier. I think that it is absolutely necessary to send the volumes directly to the scientists who have submitted the work rather than to libraries or to places where they will serve as a reference tool. In terms of motivation there is one point that really hasn't been discussed as much as it deserves - since this meeting deals with methods and problems too - that is the question of having the lowest possible charge to the user or actually fully subsidizing the service that you supply. You spend so much money in developing the system and collecting, that the tendency is then to try to recover some small amount. This nuisance charge really interferes greatly with the use of the system and it is extremely important to make it as low as possible to encourage the widest use. This point has, I think, tremendous importance in developing methods that promote the use of the system.

Y. DE HEMPTINNE: I wish to thank all the participants and the panelists for their lively discussions and I am turning the meeting over to the President.

D. HERSEY: Thank you very much Mr. DE HEMPTINNE. We appreciate your role here this afternoon as Moderator and certainly the participation by your panel. I hope we have been able to respond to at least some of the questions which have been raised in the user needs area - clearly there are some which we are going to hear more about tomorrow and I hope we will have more dialogue and more discussion.

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Session III
Part 3
Paper 28

Summary

STUDY ON CURRENT INFORMATION SERVICES ABOUT ONGOING RESEARCH IN ARGENTINA

The paper intends to determine the present needs and opinions as regards current services in ongoing research in science and technology, from different kinds of users and potential users in Argentina, as a result of a survey covering a selected group of policy-makers and researchers in several fields of interest. First, it presents an introductory background concerning this matter: a short experience as a general guide, some isolated efforts of the University of Buenos Aires and other institutions, and a previous survey, in 1962, by R.L. CARDÓN. After this, the paper describes the present survey, summarizing and analyzing the different points of view, and draws some general conclusions.

Résumé

ETUDE RELATIVE AUX SERVICES D'INFORMATION SUR LES RECHERCHES EN COURS EXISTANT EN ARGENTINE

L'objet de cet exposé est de déterminer quels sont en Argentine les besoins et les opinions actuels des différentes catégories d'utilisateurs effectifs ou potentiels en ce qui concerne les services d'information sur les recherches en cours dans le domaine scientifique et technologique, d'après les résultats d'une enquête auprès d'un échantillon de responsables politiques et de chercheurs spécialistes de diverses disciplines. Tout d'abord, dans un exposé d'introduction, l'auteur faisant l'historique de la question retrace une brève expérience pouvant servir de guide général, et rappelle certains efforts isolés de l'Université de Buenos Aires et d'autres institutions ainsi que l'enquête antérieure effectuée en 1962 par R.L. CARDON. Il décrit ensuite l'enquête actuelle, résume et analyse les différents points de vue et tire certaines conclusions générales.

STUDY ON CURRENT INFORMATION SERVICES ABOUT ONGOING RESEARCH IN ARGENTINA

R.A. GIETZ

At present there does not exist in Argentina a service that provides information about ongoing research in the country, as a guide for researchers, managers, planning or policy makers in science and technology. The performed study tries to determine if it is possible to structure an information system to satisfy the different users' needs, starting from available elements.

For this purpose it was necessary to gather background information and opinions to guide the design of such a system. In Argentina, the first general guide of ongoing research was made in 1955. It was published by the former National Direction for Scientific and Technical Research, now the National Council for Scientific and Technical Research. It included almost all pure and applied sciences, technology, and social and human sciences. It recorded 1660 research projects that were being done in the country to satisfy specific purposes of the governmental plan. A ten-issue series appeared classified according to large subject groups. Each record included the research project title, its purpose, techniques used, performing organization, researchers, conclusion date, relation with the goals of the government plan and the address where additional information could be requested. It also included alphabetical investigator and subject indexes [1].

In 1962, the Secretary of the National Council for Scientific and Technical Research, Mr. Raul Luis CARDON, made a survey on the scientific documentation situation within Argentina, from the point of view of the researcher, in order to write a paper later presented to the Latin American Seminar on Scientific Documentation. The meeting, held in Lima in September of that year, was cosponsored by UNESCO and the Ministry of Education of Peru [2]. Eighty researchers, belonging to different scientific and technical disciplines, excepting the social and human sciences, responded to a questionnaire. One of the questions referred to the desirability of publishing a guide that would periodically report on ongoing research projects in the country. He received 47 affirmative replies, 22 definitely adverse, and 6 which, without disregarding the interest or possible profit of the guide, did not consider it necessary, urgent or opportune; five researchers did not reply to the question.

Summing up, the favourable arguments were that publishing such a guide:

- facilitates contact between the researchers,
- promotes work done in collaboration,
- avoids unnecessary overlaps,

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[1] GUIA de investigaciones en proceso de desarrollo. Buenos Aires, Direccion Nacional de Investigaciones Cientificas y Technicas, 1955. 10 vol.

[2] CARDON, R.L. La documentacion en la Republica Argentina. Seminario Latinoamericano sobre documentacion Cientifica, Lima, 3-8 de setiembre de 1962. Montevideo, Centro de Cooperacion Cientifica de la Unesco para America Latina, 1962. SLADOC I-1. 63 p.

- allows one to have a general view of the research within the country and to disseminate that information abroad,
- has a stimulating effect.

The adverse arguments and dangers pointed out were:

- the reciprocal knowledge among the researchers of ongoing work is better done by means of personal contacts, visits and scientific meetings,
- in many specialties, the limited media of our country helps to foster a direct knowledge and makes it unnecessary to have an informative publication,
- it is difficult to elucidate, through a publication, the seriousness and scientific strictness of the research projects, apart from its apparent interest,
- the guide may contribute to stimulate frictions or to originate conflicts.

One remark was that the usefulness of such a guide is proportionally inverse to the possibility of a direct contact between the persons or centres working in the same discipline.

A second effort was an ongoing research inventory conducted by the University of Buenos Aires. In 1967 this effort was entrusted to the Librarianship Institute of the University, and it was proposed that it be made known by means of an annual publication. Processing and updating were to be computerized.

In 1970 the Guide to Ongoing Research in the University of Buenos Aires - 1968 3/ was published. The Guide recorded 1577 projects, including in each entry: school, branch or unit, research number, classification /UDC/, title, director of the work, main reseracher, collaborators, starting date, duration, research condition, sponsoring organization, estimated cost, publications, abstract, and remarks.

The record of each work included key words /they do not appear in the printed entry/ that were used for subject indexing and some data for storage: researcher's academic degrees and position, working full/part time, specialization, specialty field of the work and possible application fields for results. The guide included, beside the subject index, an investigator index, a research units list, and a personnel and research statistical table, listing the number of research directors, researchers and collaborators.

In a third effort, a survey of ongoing research was conducted in 1969-1970, resulting in a provisional publication. Now a new survey is being undertaken, and some hope exists of making a new publication with the data gathered. As the cost is very high, the program has been delayed.

It is worthwhile to mention some difficulties observed in the preparation of the 1968 guide:

- the classification and indexing of the research projects - key words obtained from the titles - were not accurate. It was not always easy to locate research starting from the subject index,
- the item "estimated cost" did not appear in many records, as it was very difficult to estimate. In many cases the same unit carried out several research projects simultaneously, with a budget assigned to the institution and with the same staff,
- the importance or level of interest of the recorded research projects is uneven due to the variations in the respondents criteria and lack of further screening of the questionnaires received.

3/ GUIA de investigaciones en curso en la Universidad de Buenos Aires, 1968. Buenos Aires, Instituto Bibliotecologico, 1970. 466 p.

When, during the present study, I took advice regarding scientific policy, the following information about data obtained from research projects in Argentina was provided to me.

In 1969, the Statistics and Information Department of the Secretary, belonging to the National Council for Science and Technique, conducted a survey on the national scientific and technical potential. Information was obtained from 961 institutes /out of 1357 initial questionnaires/ throughout the country. These institutes were part of approximately 250 larger organizations /universities, public centralized and decentralized organizations, private commonwealth institutions, and state and partly public and partly private companies/.

The questionnaire used included, among others, questions concerning:

- institution identification,
- fulfilled activities,
- human resources /individual identification/,
- ongoing research projects,
- scientific instruments,
- financing sources,
- application of expenses.

The information obtained was transcribed to specially designed data input sheets, although it only covered the numerical or classified data susceptible to code. Once the verification was done, a computer file was organized.

At the same time that the results of calculating the comparison of data were obtained, preliminary reports were written, and the definitive report was published in 1971 [4].

The information aiding in scientific policy making regarding ongoing research projects arises from the data requested in part of the questionnaire:

1. Number and name of the executor unit,
2. Main scientific discipline in which the unit is interested /code drawn from a codified disciplines list which had been made for that purpose/,
3. Research lines /or programs/. Titles,
4. Projects being performed. Titles /one or more by program/,
5. Statement as to whether the program is: "1" for basic research; "2" for applied research; "3" for experimental development,
6. Scientific discipline /one or more/ of each program /codes/,
7. Probable application field /code drawn from a list of codified application fields which was made for that purpose/,
8. Names of those researchers that have been assigned to the project /scientific staff belonging to the unit and visiting scientific staff/,
9. Names of the national and foreign institutions that cooperated,
10. Source of the project: "1" by its own enterprise; "2" requested or entrusted,
11. Main financing source of the project: "1" by means of subsidy; "2" research agreement; "3" others.

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[4] Secretaria del Consejo Nacional de Ciencia y Tecnica. Potencial cientifico y Tecnico nacional. Institutos de investigacion de los sectores publico, universitario y privado de bien publico. Resultados de la encuesta llevada a cabo durante 1969. Buenos Aires, 1971. Tomo I. Resultados e informe; tomo II. Anexos.

Information identified by codes or that which was quantified /number of lines, of projects, of researchers/ was entered into a computerized file.

More importantly, lists were prepared which contain all the information on the 9833 projects mentioned in the questionnaires.

Those lists include the following data:

- province and development region code,
- main organizations and intermediate sections,
- institute,
- person responsible for the Institute,
- number of projects,
- codes of the disciplines covered by the projects /if there are more than one the projects appear in several lists under each discipline/,
- discipline by which the program/s/ /project/s/ are recorded,
- research program or line,
- title/s/ of the project/s/,
- number of people on the staff,
- kind of research /basic, applied, experimental development/,
- probable application field /code/.

As the main purpose of the survey was to get quantitative or classified data for scientific planning acitivities, the remaining information /titles, names/ was obtained with less than desirable standardization and accuracy. For example, the titles of the research projects often appear in synthesized form /for lack of space in the questionnaire/, and they are not comprehensive enough

In spite of this, and at the request of scientific organizations research centres, etc., we were asked questions such as: what projects are developed in this or that discipline and where? The replies were obtained from the folders of projects.

The scientific discipline classification covers 30 main disciplines /codified with two digits/ and each of them are subdivided into sub-disciplines /with four-digit codes, corresponding to the first and second levels/. Many, developed at the same time, were assigned a third hierarchical level by adding a period and two more digits. This list was revised and modified after the survey, making use of the questionnaires received. A new provisional list was mad for internal use. This list was also modified. Then, a questionnaire was elaborated for the next survey. The data element record relating to research projec took into account, in contrast to the one previous, the complete title of each project and up to seven key words for its indexing in a three-alphanumeric-character code, which were to be drawn from a codified list of 1422 key words selected from the titles collected in the previous survey. The purpose was to be able to enter the codes into a computer file for retrieval purposes. A test wa made which did not give satisfactory results. I believe it was due to the limitations of the indexing language and of its application to the projects and th searches.

The questionnaire was again modified in 1974, as well as the classifications, in support of the survey presently being conducted. The information is being requested using two sets of questionnaires together with the corresponding instructions 5/ . One set is for research institutes and the other for the scientific research staff. The first gathers information about ongoing research projects, and the project identification number acts as a nexus for the relation with the researchers' questionnaire set, in which the identification numbers of all the projects in which he participates are requested.

In the new record the projects must be transferred according to the title, but that information is limited to 53 characters, which are then filed in the computer for subsequent printout. This restriction arose from the results of a study of the project titles in previous surveys, which indicated that project titles seldom exceeded 53 characters. The possibility of retrieving information by means of key words was laid aside.

The correlation by means of the project numbers between both questionnaire sets provide for computer listings of projects complete with the following information:

- programs and projects order number /2+2 digits = 4 digits/,
- programs and projects titles /up to 53 characters/,
- kind of research: basic, applied, for experimental development, /codes 1, 2 or 3/,
- covered disciplines /classification in 2-digit code/,
- probable application field /classification in 4-digit code/,
- estimated duration in months /pointing out the beginning and the end/,
- number of participating scientific personnel,
- weekly hours-man estimation,
- performance state /in percentage 01/99 of the whole expenses, time,etc./,
- research staff /the name and all data concerning each of them, as it appears in the questionnaire, in which the number/s/ of the programs/projects in which he participates are requested/.

This survey has been distributed among 85-90% of the previously surveyed institutes and personnel; 15% of replies have been received, and there is the hope of completing it by the end of the year. The data will be processed in 1976. It is thought the survey will provide information on 11 000 or 12 000 ongoing research projects in Argentina.

It is also important to point out another activity of the Secretary of Science and Technology as regards ongoing research projects, by means of which complementary information may be obtained. For the budget program between 1971-1974, the Secretary made a survey of the national scientific-technical system "offer" for research, technological development and technology transfer. The organizations that were to present programs were required to complete in-

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5/ Secretaria de Estado de Ciencia y Tecnologia. Inventario del potencial cientifico y tecnologico de la Republica Argentina. Buenos Aires, 1974. Material for the survey.

- Encuesta a institutos de investigacion:
  Cuestionario.
  Instrucciones, definiciones y clasificaciones.
- Encuesta al personal cientifico e investigador:
  Cuestionario.
  Instrucciones, definiciones y clasificaciones.

formation forms. The programs could be of research and development, building or management. Among other information, the forms covered the program denomination, most probable application field, benefits, affected personnel, scientific and contributing disciplines, starting and ending date, definition of purposes, description of the task plan, description of the program methodology, its justification or progress aspects, transfer feasibility, expenses, financing sources and opinion on the value of the program. Accurate standards were established for the presentations, including code lists to be used in filling in the data sheets, for computer purposes [6].

Another element of judgment entailed with the subject concerning us is provided by the following activity developed by the Secretary of Science and Technology: between 1970/1972, when it was decided that a tax exemption would be granted to those private companies carrying out scientific and technical activities in research and development, the Secretary reviewed 290 presentations with 1800 projects, on which he had to give a favourable or unfavourable opinion for granting the benefit. Only a 5% of the projects were accepted. The others were rejected for two main reasons:

- although related to scientific and technical activities, the project could not be considered to be research and development,
- there was a lack of the information needed for the decision, probably due to the fact that many companies, protecting their industrial secrets, were not sufficiently explicit in describing their research.

Another activity of the Secretary concerning research projects is the survey that is being conducted, at the request of the Department of Foreign Affairs of the OAS General Secretariat, for achieving the goals of the Regional Program for Scientific and Technological Development. The survey consists of accumulating data for an Interamerican Directory of Development and Research Institutions, which will constitute important basic information about the resources of the scientific and technological systems of the OAS Member States and will help to answer the following questions:

- Who carries out research and development within the region?
- Where are the institutions situated?
- What resources do they rely on?
- Which are the main subjects /and/or process or product groups/ on which research and development are carried out?

In Argentina, the survey will be useful to the Secretary for completing or updating his institution file.

The form includes the following items:

- Name of the institution,
- Address,
- Name and office of the public official responsible,
- Kind of institution /options: government, education, without any commercial purpose, foundation, etc./, company /private, partly public and partly private or state/, others /specify/,
- Name and address of the division, department, etc., that is carrying out the research and development,
- Kind of research and development /options: basic research, applied research, experimental development/; purposes /options: for its own usage, for its sale or contracting, for educational or gratuitous public use/,

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[6] Subsecretaria de Ciencia y Technica. Preparacion del presupuesto nacional en ciencia y tecnica para el ejercicio 1974. Normas generales para la presentacion de programas. Buenos Aires, 1973. 29 p.

- Subjects and/or product or process groups on which research and development is conducted, in order according to importance,
- Number of scientists /discriminating disciplines/ and number of technologists /discriminating engineering branches/.

When I started the present paper, my purpose was to gather background concerning the efforts made in elaborating guides on ongoing research and to get opinions about the different needs for this information, in order to take into account the feasibility of a service of the sort that will simultaneously satisfy the wishes of the scientists, research directors and policy makers in science and technology.

From the obtained elements we have ascertained that:

1. the efforts made in publishing the guides were limited and not very thorough,
2. through surveys of national scientific and technical potential, very important information on ongoing research is being obtained which satisfies the scientific policy planners' needs,
3. in order to provide a service that can be used by the research directors and scientists in general, without the need of thinking of a great additional or parallel effort, it is necessary to develop an appropriate description and means of dissemination or publication of specified data /reducing them to what is essential taking into account priorities according to disciplines, etc./ according to the scientists' interest.

From the conversations with several researchers, it seems that the planners require the greater amount of quantitative and classified data for statistical purposes. The researcher is mainly interested in the research title - as descriptive as possible - or in a description of the project, where the research was done and who did it. This lets him contact other institutions or persons working in his field, visit the unit where the research is being conducted, obtain preliminary and intermediate reports, etc. His interest is especially centered in the work content, and for that he needs some previous judgment elements that will allow him to evaluate it with respect to his own work and with respect to its seriousness and importance. Moreover, the researchers' interest extends beyond the frontiers of the country,and it is clear in most cases that an exchange of ongoing research information at an international level would be quite beneficial.

We believe that it is in those fields of science in which current information has at an international field more fluency that the possibilities for information exchange on ongoing researches are more favourable. Maybe they are in a lower scale in some applied sciences. It is pertinent to ask oneself what possibilities exist of information exchange on ongoing technological researches. The present trend within scientific policy - with strong reasons in the developing countries - is to try to fulfill national development goals, making use of science and technology in order to impose conditions on the exploitation of the natural resources and on industrial increases, stimulating an increasing interest in the technological research. Dr. CICARDO 7/, who presides over the National Council for Scientific and Technical Research of our country, has recently pointed out that "while science has an international character because its acquisitions are spread by means of specialized journals, technology conceals its discoveries because of their industrial and commercial meaning, and it establishes them as their property." He added then that such technology "is available in the international market as machines or raw materials, otherwise as patents or licenses".

7/ CICARDO, V.II. Ciencia y tecnologia en paises en desarrollo. Informaciones del Consejo Nacional de Investigaciones Cientificas y Tecnicas, Buenos Aires, number 100, abr.-may. 1974, p. 1-8 y number 101, Jun.-Jul. 1974, p. 1-10.

It is obvious to suppose that within the technological sector, where the dissemination is restricted, the problem will be greater regarding the information on ongoing researches. Nevertheless, they are the most interesting for the developing countries.

Conclusions

1. Starting from the available information obtained through existing surveys about scientific and technological potential, it is possible to elaborate a guide, as a subproduct, and to provide an ongoing research information service in Argentina.

2. The modification of the data elements in the questionnaires where more information is requested, will not present important changes. Greater accuracy and standardization in the titles or description of research projects should be secured, so as to better reflect the content of the research.

3. Without the necessity of having the title or description of the research projects entered in the computer file for the general treatment of the data required in surveys, a secondary file is envisioned from which it could be possible to automatically print partial lists or to produce a general publication, which incorporates indexes of institutes, researchers according to disciplines, fields of application, etc., referencing research project number to entries in the text.

4. For the design of the system, insuring the interconnection with similar services at an international level, it would be necessary to have at one's disposal adequate guidelines in aspects such as the record format standardization, classification of disciplines and application fields, among others.

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Session III
Part 3
Paper 29

Summary

BASIC CONSIDERATIONS CONCERNING THE DESIGN AND ORGANIZATION OF INFORMATION SYSTEMS IN ONGOING RESEARCH

The factors determining the organization and the structure of information systems in ongoing research are:

a/ the character of the input into the system - the variety of inputting institutions, the need to organize special input records on project data as opposed to bibliographic data, the standardization of data elements and input procedures, open and classified research, etc.;

b/ the demand for information on ongoing research, differentiated according to the needs of the various groups of users - policy-makers, decision-makers, administrators, managers, scientists, engineers, etc.

The structure of the systems may vary

a/ according to their political and geographical extension - national, regional or international;

b/ according to their subject scope - one or more subject fields or disciplines, general polythematical subject coverage.

For reasons of completeness and efficiency of both national and international supply of information on research and development, international information systems or networks might be conceived which ought to be based on polythematical, national and/or regional subsystems on the one hand, and on subject-oriented international subsystems on the other.

Such systems and subsystems would be suitable for the collection, registration, storage, retrieval and dissemination of information on research and development. The information processed could refer to various phases of ongoing research:

a/ assignment of funds for a research project;
b/ effective starting of the research work;
c/ modifications of important project data;
d/ termination or abandonment of the project.

The next logical step would be to extend the scope of the information systems and subsystems concerned to include:

a/ data about the research results, presented usually in the form of a research report;

b/ the research reports, hard copies, microcopies, etc.

The project and/or research data to be registered and the definitions of their contents and limits are especially important both for the design and the operation of the information systems envisaged. Finally, the paper deals with information languages for classification, indexing and retrieval.

Résumé

QUELQUES CONSIDERATIONS FONDAMENTALES SUR L'ORGANISATION ET LA STRUCTURE DES SYSTEMES D'INFORMATION SUR LES RECHERCHES EN COURS

Les facteurs qui déterminent l'organisation et la structure des systèmes d'information sur les recherches en cours sont:

a/ les caractéristiques du flux d'entrée dans le système: diversité des institutions contribuant au système, nécessité d'organiser des enregistrements spéciaux pour les données relatives aux projets par opposition aux données bibliographiques, normalisation des éléments de données et des procédures d'entrée, nature de la recherche /confidentielle ou non/, etc.

b/ la demande d'informations sur les recherches en cours, qui varie suivant les besoins des groupes d'utilisateurs - hommes politiques, responsables des prises de décisions, administrateurs, gestionnaires, savants, ingénieurs, etc.

La structure du système peut varier selon

a/ son envergure politique et géographique - nationale, régionale ou internationale,

b/ sa portée sur une ou plusieurs matières ou disciplines, ou bien portée sur l'ensemble des matières.

Pour rendre plus complète et plus efficace la fourniture d'information sur la recherche et le développement, il devrait être possible de concevoir des systèmes ou réseaux internationaux d'information fondés d'une part sur des sous-systèmes polythématiques nationaux ou régionaux, et d'autre part, sur des sous-systèmes internationaux spécialisés. De tels systèmes et sous-systèmes se préteraient au rassemblement, à l'enregistrement, au stockage, a la recherche et à la diffusion d'informations sur les travaux de R et D. Dans l'information traitée, on pourrait faire état des diverses phases des recherches en cours: a/ allocation de crédits à un projet de recherche; b/ début effectif du projet; c/ modification d'éléments importants du projet; d/ achèvement ou abandon du projet.

L'étape logique suivante consisterait à étendre la portée des systèmes et sous-systèmes d'information de manière à inclure:

a/ des données sur les résultats des recherches présentés habituellement sous forme de comptes-rendus de recherche;

b/ comptes-rendus de recherche, des copies sur support papier, des microreproductions, etc.

Les données sur les projets ou les recherches qui doivent être enregistrées et la definition de leur contenu et de leurs limites sont particulièrement importantes tant pour la conception que pour le fonctionnement des systèmes d'information envisagés.

Enfin, les auteurs de l'exposé traitent des langages d'information pour la classification, l'indexation et la recherche documentaire.

BASIC CONSIDERATIONS CONCERNING THE DESIGN AND ORGANIZATION OF INFORMATION SYSTEMS IN ONGOING RESEARCH

P. LÁZÁR, E. VAJDA, I. PAPP

Information systems are the subject of many investigations, experiments, articles, etc. The overwhelming majority of information systems handle either bibliographic information /data of documents/ or data information /scientific, technical economic, social data/. Information systems in ongoing research may be attributed to the second group. The set-up of these two types of information systems and the requirements they have to answer are not identical. On the other hand, there is an obvious trend, based mainly on economic reasons, to develop both types of systems on similar lines. It seems, therefore, to be useful to investigate differences and common features of these two types of systems with emphasis laid on the problems of research information systems.

1. Characteristics of information systems in ongoing research

The first peculiar feature of information systems in ongoing research concerns the fact that the data registered do not refer to any published or near-published document which exists independently of the system. These data might be found in several working documents /as opposed to published documents/ which have a bearing on various phases of a research project. This complicates the design and set-up of the information systems in ongoing research: specific organizational effort is needed for collecting and recording of data. On the other hand, there is a certain advantage in the fact that the systems must not be adapted to a predetermined set of data, which is the case with bibliographical information systems.

An essential characteristic of information systems in ongoing research is the fact that they have to reflect ongoing activities. Neither the input data, nor the files formed by them, can be regarded as of static character. The original input data related to a research project in its initial stage will most probably become, sooner or later, data on a finished research. At a further stage the same data might become obsolete and lose their significance. Information systems in ongoing research are highly dynamic systems and must, therefore, be updated continuously by the inclusion of new input data, but also with regard to the changing functions of the data recorded initially on a specific research project.

Another important feature of these information systems consists in the diversity of the institutions supplying input. Research may be carried out in various types of institutions: governmental or private research institutes, universities, research laboratories of enterprises, etc. Research may be financed or commanded by institutions which are not necessarily identical with the institutions which carry out research work. Consequently, the input data may by supplied either by the financing institutions or by the research institutions, or by both.

As opposed to bibliographic data and published numerical data, data on ongoing research poses a much greater problem in regard to access to data. A research project might be classified because of economic, social and political reasons. Secrecy may cover the contents and results of a research project, or even its existence. Secrecy may be total insofar as a research project may be confidential for everybody except the financing and executing institutions. In other cases, broader or narrower restrictions may be imposed both as to the beneficiaries of the information and the availability of all data recorded.

Structural and operating characteristics of the information systems in ongoing research have to take into account the information needs which the systems have to satisfy. These systems have to answer similar needs as information systems handling literature: they have to supply new information for the generation of creative ideas, and to contribute to the elimination of unnecessary duplication of research efforts. In addition, these information systems have to serve governments and other institutions in decision making by supplying information on research trends, previsions and prognoses. Obviously, institutions responsible for science policy decisions require specific information services which rely on statistical or other generalization of individual research data rather than on detailed contents of, or data on, individual research projects, institutions or persons.

Currently information systems tend to become increasingly international. Input drawn from indigenous sources is getting less and less sufficient for the operating of information systems which are supposed to satisfy the demands they have to face. Even the biggest and most advanced countries cannot be contented with the registration of data on research done within their frontiers. On the other hand, their chances to collect exhaustive research data from abroad in a traditional manner seem to be minimal.

2. Problems of systems design and organization

Coverage

In order to serve their purpose, national information systems in ongoing research must aim at exhaustive coverage. Though partial information might help incidentally to avoid unnecessary duplications of research or to indicate new results, these goals cannot be attained fully without a complete data base. Science policy decisions very definitely require complete coverage of research projects.

Therefore, the most comprehensive supply of input is of vital importance for information systems in ongoing research. How to comply with this condition, and which methods to apply, depends considerably on the socio-economic conditions of the country in question.

As a general rule, data on ongoing research financed out of public means may be collected rather exhaustively; input data may be supplied by the financing institutions and this may be stipulated relatively easily by legal or other obligations.

The conditions for the exhaustive registration of ongoing research is provided in socialist countries where the institutions financing or executing research are public bodies and thus can be obliged to provide appropriate data for the research information system. Which type of institutes to oblige to provide input data depends exclusively on practical considerations of information systems design.

In countries with private or mixed economies the input may be provided by the financing institutions, either by legal obligations, or by voluntary reporting, eventually by a combination of both. It is practical, however, to arrange for the additional reporting of the institutions executing research /similarly by legal obligation or voluntarily/, since a double system of reporting may guarantee a more complete input. In this case an input control mechanism must be established within the system in order to eliminate double recording of data.

Recording of terminated research

An essential organizational problem is the collection and recording of data on the suspension, abandonment or termination /in short: termination/ of a research project.

Research information systems may, and indeed should, register different phases of each research project:

a/ planning of the project,

b/ assignment of funds,

c/ starting of research work,

d/ modifications of important project data, and

e/ termination of the project.

A well-designed information system on research in progress has to contain all these input data, including the last one, which allows one to convert an open research information system, characterized by recording all or some of the data enumerated under a/ to d/, into a closed system providing the complete history of each registered project. Without registering the termination of research projects, the system cannot claim to inform on ongoing activities.

This leads us to the investigation of the relationship of information systems in ongoing research to those in terminated research /represented practically by systems handling data of research reports/.

In our view the separation of these two types of systems is, in general, unjustified. In order to provide a full picture on research activities, research information systems have to collect and process the following data in addition to those mentioned above:

f/ data on the results of the research work /usually the data of the research reports/,

g/ the research reports themselves /in hard copies, microcopies, etc./.

Several intermediate types of research information systems are conceivable and feasible too. There are national systems which do not store and disseminate research reports /item g/ above/, but include data on reports /item f/ above/. Such a system might be especially satisfactory if complemented by, and organically linked to, a national depository of research reports. In the absence of such a depository the research information system cannot satisfy completely the information demand of its users.

A system not collecting and processing data on research results /item f/ above/ might give even less satisfaction to its users. Such systems might nevertheless provide information on the termination of research projects if data corresponding to item e/ above are kept in its files, or if a separate file of terminated projects is maintained.

Other variants may be:

a/ the periodic weeding of the entries of terminated projects /if the system is recording termination at all/, or

b/ the periodic weeding of the entries of ongoing projects /if the system is not recording termination/.

In both cases the time periods for weeding must be measured in years.

National and international systems

The prevailing tendency favouring the extension of information systems to international coverage or the interconnexion of national information systems poses the problem of the feasibility of international information systems in ongoing research. The issues to be clarified in this respect are similar to those to be investigated in relation to the interconnexion of other national information systems on an international level.

As already indicated above, national research information systems should aim at complete coverage. In this specific context this means that they have to handle research information relating to all, or the major, scientific disciplines or branches of activities. Both theoretical and practical considerations impose this view:

a/ the development of science is a multidimensional processus. It is manifesting itself in the continuous extension of human knowledge partly by pursuing research goals and exploring science fields already unfolded, partly by getting inspiration and stimulation through cross-fertilization of ideas from border fields and/or remote fields, providing thus both a differentiative and an integrative processus of science, and

b/ the development of the needs and interests of users of research information systems correspond to the development of science as characterized in a/, thus exerting pressure on research information systems to provide both very detailed information on very specific subjects, synthetical information on the integrative aspects of scientific development.

From the point of view of systems design and operation, however, the extension of the coverage to all, or the major, fields of human knowledge and activities poses serious problems in the organization of both input and output, and especially the processing and retrieval of information.

The interaction of national information systems, their interconnexion, and the formation of international systems tend to aggravate the difficulties mentioned in the preceeding paragraph, especially as international information systems are usually confronted with one more basic problem, namely that of the integration of information provided in various languages.

The technical handling of the enormous mass of research information involves difficulties too. The quantity of items to be processed by a universal international information system in ongoing research including all, or the major, scientific disciplines and branches of knowledge on the one hand, and all geographic regions of the world on the other, might reach the order of magnitude of several millions per year. The design and setup of such large information systems is extremely difficult because of the required sophistication of design of a system processing several millions of new items annually.

On regional level, there already exists an outstanding example of a universal international research information system in the framework of the International Information System for Science and Technology of the socialist countries. This system is universal as to its subject coverage but, at present, it collects and processes only information on terminated research. Nevertheless, the experience gained by the design, development and operation of this international system will be most useful to determine development prospects of international research information systems.

Instead of the interconnexion of national and regional research information system into a worldwide universal system, multidisciplinary national and regional research information systems might be interconnected with specialized international information systems, either limited to research information or open to other types of data as well. This international linkage may simplify the international flow of research information, ensuring at the same time international access to national research data in any specific discipline or branch.

3. Problems of information processing and retrieval

The efficiency of an information system, be it meant to provide current awareness services or retrospective information, depends basically on the data collected and stored, and on the way of their processing and retrieval. We have dealt with the first aspect in the previous chapter, now we turn to the processing and retrieval aspect.

Standardization

Obviously standardization must be given highest priority when designing information processing. The aim of standardization is to facilitate low-cost information transfer in general, involving both manual and machine methods. Standard procedures must be applied to all elements of information processing, though with somewhat less impact to those processing elements which relate to the subject contents of information sources.

The development of national and international standards is correlated with the rapid development of international information transfer. Standards cover an increasing variety of subjects, such as bibliographical description, record format, data element specifications, filing, etc. The existing international standards in the information field refer mainly to bibliographical information and other information derived from literary sources on the one hand, and to numerical and other data information on the other.

Data on ongoing research are largely different from data on literary documents, even be they research reports. To give a few examples, the name of the institution financing a research project, the funds assigned to a project, the costs of a research, the date of the beginning of research activities, etc., do not occur usually in traditional literary sources of information, sometimes not even in documents presenting the results of a research work. It is also true that data such as the date of publication, format, number of pages etc. have no counterpart in information systems in ongoing research, unless this system is a closed one /see above/, i.e., it includes data on research reports too.

National and international standardization of the record formats, the tagging and the contents of data elements, etc., to be used in information systems in ongoing research seems to be highly desirable and very urgent. These standards must be, as far as possible, compatible with national and international standards for processing of bibliographic and numerical data.

Indexing and retrieval

Indexing and retrieval poses far more complex and sophisticated problems. According to universally accepted practice there are three principal tools which may be applied to retrieval of subject information:

a/ hierarchical classifications, either adapted from classification systems developed for general use or any specific application, or developed for the purpose of the research information system. Hierarchical systems might be extensively structured in depth /as for instance the Universal Decimal Classification/, but those applied to universal research information systems usually do not contain many hierarchical levels. These classification systems characterized by a low grade of hierarchization have, in general, to be complemented by one of the following tools;

b/ descriptor languages, based on thesauri or some other controlled vocabulary. It must be mentioned, however, that the construction and maintenance of universal, multidisciplinary thesauri seems to be extremely difficult; the problems encountered hereby surpass in complexity and sophistication those presented by monodisciplinary thesauri;

c/ free text searching, using the text of the records /both titles and the abstracts/. This straightforward method is very flexible, but needs highly qualified information specialists to conduct searches in order to avoid pitfalls caused by synonymy, on the one hand, and the absence of a semantic system reflecting interrelationships between indexing terms, on the other. Free text searching may only be applied in interactive men-machine retrieval systems. The procedure is rather costly, and the loss of information may be bigger than in case a/ or b/.

Information retrieval systems often apply combinations of these tools. In our view this seems to be the only realistic and efficinet approach to the solution of retrieval problems.

Hierarchical classification systems seem to be indispensable because:

a/ they allow a global perception and inspection of the subject contents of the whole information system, and

b/ they provide means for indexing and searching according to very generic terms.

The other indexing and retrieval tools cannot be used efficiently without relying on hierarchical classification in one way or the other.

Of course, the reverse of this statement is also true. In order to ensure a strict semantic control for searching, in-depth hierarchical classification must be complemented by thesauri or similar tools, unless the information density of the subject fields to be searched is rather low. Thesauri complementing hierarchical classification must not be universal but should be developed in depth in limited subject fields.

Finally, there is a case for free text searching complementing either of the two other retrieval tools mentioned above, especially for controlling and refining retrieval products. Provisionally and temporarily it may even replace searching by controlled retrieval language, but, because of the higher risk of loss of information and the excessive demand of highly skilled personnel, only provisionally and temporarily.

The design and operation of research information systems, especially the problems of indexing, classification and retrieval require systematic research efforts by information scientists. International cooperation and the guidance of international organizations having a vocation in the promotion of both information and research like UNESCO, ICSU, FID, etc., is indepensable for rapid progress in this particular field.

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Session III
Part 3
Paper 30

Summary

AFRICAN ADMINISTRATIVE AND MANAGERIAL RESEARCH IN PROGRESS

/A Data Base File within the African Integrated Network of Administrative Information - AINAI/

This brief research project expands further the facet of ongoing research corresponding to the original investigation on the Feasibility of Establishing an African Integrated Network of Administrative Information - AINAI. The proper utilization of Africa's scarce resources justifies the development of this database file on research in progress within AINAI. It is aimed at minimizing the duplication of efforts and expenses in conducting research projects in administrative and managerial sciences within the African environment. Some attempts in ongoing research in social sciences are pointed out, although they have not fully accomplished their aims. The input data of this project will be systematically fed in through a network of African member correspondents to insure comprehension in coverage, periodic up-dating and inter-connexion with other AINAI files when developed. The nature of the project implies its immediate implementationwhile developing the whole AINAI system.

Résumé

RECHERCHES SUR L'ADMINISTRATION ET LA GESTION EN COURS EN AFRIQUE

/Un fichier central de données constitué dans le cadre du système intègre africain d'informations administratives - AINAI/

Ce projet de brève durée permettra de développer les travaux relatifs aux recherches en cours entrepris lors de l'enquête initiale sur la possibilité de créer un Système intégré africain d'informations administratives. La nécessité d'utiliser rationnellement les ressources limitées de l'Afrique explique la constitution, dans le cadre dudit système, de ce fichier central, qui vise à réduire les gaspillages d'efforts et d'argent en ce qui concerne les recherches menées en Afrique au sujet des sciences administratives et de la gestion. Certaines recherches en cours dans le domaine des sciences sociales sont signalées bien qu'elles n'aient pas pleinement atteint leurs objectifs. Les données d'entrée seront régulièrement fournies par l'intermédiaire d'un réseau de "membres correspondants" africains, afin que les informations recueillies soient complètes, périodiquement tenues à jour et reliées au contenu des autres fichiers d'AINAI au fur et a mesure de leur établissement. La nature de ce projet exige qu'il soit mis en chantier immédiatement en même temps qu'on s'occupera de développer l'ensemble du systeme AINAI.

AFRICAN ADMINISTRATIVE AND MANAGERIAL RESEARCH IN PROGRESS

/A Data Base File within the African Integrated Network of Administrative Information - AINAI/

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AINAI background

The development of AINAI is proposed to counter the problems posed in the African administrative environment with regard to information generated or to be generated and to share in its utilization. It is a decentralized, co-ordinated and voluntary African administrative information system and one of its objectives is to produce complete and timely information about research underway as well as its results. The system would imply an accelerated degree of diffusing and popularizing reliable administrative information, and a steady increase in the ability to serve at all points by co-operative sharing without constraint of time, distance or form of data.

AINAI data base

The data base of AINAI is not restricted to information of a bibliographic nature alone. It comprises, beside bibliographical data, different files on administrative and managerial institutions and agencies, training programmes, training materials, trainers and consultants, and on research in progress. Therefore, the data base file on research in progress is an indispensable element within the system.

The problem of research in progress

Unfortunately, this subject has received very little systematic attention, neither on national or regional levels, nor from African researchers and policy makers. It is, therefore, not surprising that there is in many African countries considerable waste of scarce research resources by duplication and irrelevant research, and a failure to disseminate and implement research findings.

In African countries with pressing claims on their limited resources, it would be difficult to justify substantial expenditure on administrative and managerial research if it did not yield greater material and moral welfare and improvement than alternative uses of the same resources. The translation of research resources into increased means for development is dependent above all on the organization of an effective system of informing and linking African researchers in administrative and managerial topics together. The AINAI data base file on research in progress could be this linking tool.

Status of African social science research in progress

In the past, some attempts have been made by a number of bodies to prepare inventories of some aspects of ongoing social science research. These have included attempts made by the African Studies Association, Research Liaison Committee; the International African Institute, Research Information Liaison Unit; Centre d'Analyse et de Recherche Documentation pour l'Afrique Noire; and, Conference of Directors of Economic and Social Research Institutes in Africa /CODESRIA/ in collaboration with the Development Centre of the Organization for Economic Co-operation and Development /OECD/.

It could be generalized that none of these efforts have succeeded in providing a complete inventory of all social sciences research under way in African countries and elsewhere, nor do they appear to have been used widely by research workers as a source of information.

Also, these efforts are very broad in nature, and directed towards Africanists, not administrators nor policy makers; geared towards academic research not to institutional and governmental studies; and issued when they are completed which makes them outdated once they are issued.

Objectives of the file on research in progress

The aim is to minimize the duplication of efforts and expenses in conducting research projects in administrative and managerial sciences within Africa through understanding the projects which are in progress, whether in Africa or elsewhere. Also, the file will link research workers in these fields together in collaborative planning and implementation of their research activities. This is intended to:

1. cut out a great deal of waste arising from duplication of research, lack of information and pursuit of trivial research;

2. provide useful guidance on research under way; and

3. direct the attention of researchers, administrators, plicy makers, etc., in ongoing research in African administrative and managerial topics.

Methodology

The input data of the file on research in progress will be systematically collected through a well-designed questionnaire form that could be applicable to computerization within the whole network when implemented. This should be in conformity with other files of the system. The questionnaire forms will be circulated to African institutions and agencies of public administration and management as well as institutions of development studies. Projects to be listed are those conducted on the:

- institutional level; by institutes, centres, agencies enterprises, etc.;
- academic level; at Master, Ph.D. or postdoctoral level; and
- individual level; by trainers, researchers, and consultants.

Information on each research project will include data on: title; subject descriptors and abstract of the research project; name of researcher, address, institution; date of the received data; as well as data on problems to be studied; its objectives and methodology; financial sponsor or backing; and dates of starting and completion of research, etc.

Periodic up-dating of the file on research in progress should be incorporated within the whole network. Also, the files of AINAI could be interconnected with each other, e.g. a new research project could name the institution and specialists concerned, and this data could be linked with those on the other files on institutions and agencies, training programmes, training materials, and trainers and consultants.

Implementation stage

Since it is envisaged that AINAI needs at least two years of preparation and planning until it will be fully operational, a new project on research in progress in African administrative and managerial topics could be evolved independently until it can be linked with the whole system.

This policy has been already incorporated in CAFRAD's research acitivities starting in 1976 which had been approved by the 15th Meeting of CAFRAD's Governing Board which met at Tangier on 19-22 May 1975.

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Session III
Part 3
Paper 31

Summary

AN INTEGRATED INFORMATION SERVICE ON SOCIAL SCIENCE RESEARCH IN THE NETHERLANDS

The Social Science Information and Documentation Centre of the Royal Netherlands Academy of Arts and Sciences is an integrated service, focussed on information on social science research in the Netherlands.

It includes detailed information on ongoing social science research projects in universities, governmental organizations, industrial organizations and private organizations, and also of theses for social science doctorates in course of preparation.

This information is updated every year. Reports of concluded projects and doctorate theses are entered into the Lending Library of Research Reports.

Raw data - punched cards and magnetic tapes - are entered in the Steinmetz Archives, a data-archive with a view to secondary analyses of research data.

These services are so much linked up together that whenever feasible this linkage should be strongly recommended.

Next to information in print /monthly bulletin, comprehensive information twice a year, cumulative information every 2 years/ retrieval services are given.

Started as a simple registration of current research projects the Social Science Information and Documentation Centre has become a nucleus of social science information. As a manual system this model is only feasible in a small or in a developing country with a not too large number of research projects. An automated system should be founded on the same principles of integration.

Résumé

UN SERVICE INTEGRE D'INFORMATION SUR LA RECHERCHE DANS LE DOMAINE DES SCIENCES SOCIALES AUX PAYS-BAS

Le Centre d'information et de documentation en sciences sociales de l'Académie royale des Arts et des Sciences des Pays-Bas est un service intégré, qui se consacre à la fourniture d'informations sur les recherches de sciences sociales menées aux Pays-Bas.

Il possède des renseignements détaillés sur les projets de recherche concernant les sciences sociales qui sont en cours de réalisation dans les universités et les organismes publics, industriels et privés, et sur les thèses

de doctorat de sciences sociales qui sont en préparation.

Ces informations sont mises à jour chaque année. Les comptes rendus des projets terminés et les thèses de doctorat sont déposés à la Bibliothèque de prêt des comptes-rendus de recherche.

Les données brutes - cartes perforées et bandes magnétiques - sont remises aux Archives Steinmetz, pour servir a des analyses secondaires des données sur la recherche.

Ce sont là deux types de services qui présentent tant de liens qu'il paraît opportun de recommander vivement leur association, chaque fois que cela est possible.

Outre la publication de documents imprimés /bulletin mensuel, publication de données complètes deux fois par an, et récapitulation tous les deux ans/, le Centre se charge de recherches documentaires.

Le Centre, qui se bornait au début à enregistrer les projets de recherche en cours, joue désormais un rôle capital pour la diffusion des informations dans le domaine des sciences sociales.

Il s'agit là d'un système manuel dont le modèle ne peut être reproduit que dans un petit pays ou un pays en voie de développement où les projets de recherche ne sont pas en nombre excessif. L'établissement d'un service automatisé devrait obéir aux mêmes principes d'intégration.

AN INTEGRATED INFORMATION SERVICE ON SOCIAL SCIENCE RESEARCH IN THE NETHERLANDS

H.P. HOGEWEG-DE-HAART

Introduction

Information is sometimes called an element in production just as raw materials are. Producers are willing to pay a price for this element and they do. Therefore, information services in science and technology are often run on a commercial basis and sometimes make a profit. Up until now this has not been true for information services in the social sciences.

Unlike scientists in physics or chemistry, social scientists do not accumulate their knowledge step by step in many small experiments, which makes it extremely important not to miss one step one of their colleagues has set already. Duplication might be a loss of time for the scientist and loss of time might give a lag in competition. A lag in competition might mean a loss of money. And therefore scientists and especially industrial firms that employ scientists are willing to pay money and sometimes quite a lot of money for information services.

Neither social scientists nor social science research institutes are as strongly motivated to gain the most recent information in their field. It is not that social scientists are not interested in information on the projects their colleagues are working on or in information on the results of their colleagues earlier investigations, but it is not as much a "conditio sine qua non" for them as it is for researchers in science and technology.

Duplication is never complete in social science. There might be a difference in philosophical background, in time, in geographical or environmental circumstances, in character of the population. Every research-project is, therefore, in a way a new one. Therefore social science does not accumulate its knowledge step by step, but gradually by comparison of many research projects evaluates the weight of different variables. Sometimes social science unexpectedly progresses with the introduction of a new paradigm, putting all the facts in a new order. This is what social scientists are really interested in. Many social scientists are not much in a hurry for new results. They want their studies to be as sophisticated as possible. Doctorate theses often take many years. There is not much to worry about if these studies are purely theoretical. Most of the social science research projects, however, are not pure research but applied research projects. Social science problems are problems concerning community, concerning human beings in relation to each other, and these problems have to be solved, often the sooner the better. Public authorities and private institutions ask for social science research to be executed in order to obtain facts and background of the social problems they have to solve. They are looking forward to the results of the investigations they have commissioned to help them make their decisions.

The philosophy behind a social science information service is that the better the social scientist knows the facts available for comparison, and keeps abreast of new methods and new technologies, and the more he knows about the developments in his discipline, the better and more comprehensive the report of his project will be. The better the report is, the better the decisions can be to the benefit of the community.

Social science information is not only an element in the production of social science reports of social scientists and social science research institutions, but is also an element in the production of policy decisions. If the social scientist does not use the most recent literature, if he does not know that his colleagues are solving a comparable problem, if he does not use an ameliorated method, it is not only to his detriment in his reputation as a researcher, but also the community is the worse for it, because if he had known, his report might have induced another and a better policy for the people concerned. And this has a much larger impact.

This long introduction was meant to stress the points

1/ that social scientists are not the only, nor the main people interested in social science information,

2/ that social science information services have to be very much user-oriented to induce social scientists to search for the most complete and the most recent information, and

3/ that as the community itself is a party concerned in the effectiveness of the information service, it is not illogical that the community, in this case the government, should subsidize social science information services.

Registration of current social science research in the Netherlands

The Social Science Information and Documentation Centre /SWIDOC/ has originated out of an initiative of the Social Science Council of the Royal Netherlands Academy of Arts and Sciences. Within the Council there was an uneasy feeling that too many research projects were covering the same topics, sometimes questioning the same population within a short lapse of time, and it was felt to be unsatisfactory that researchers could not make use of the experience of their colleagues at an early stage. In 1963 a social scientist was appointed in the Council's Bureau to establish a register of current social science research projects in the Netherlands.

The Social Science Council has members from the various disciplines in social and behavioural sciences and the registration was meant to cover research in these disciplines: sociology, social and cultural anthropology, psychology and education, social geography, demography, town and country planning, political science, public administration, criminology and also social medicine, social economics and social history.

There were only a few examples of Registers of current social research: The Register of Research in the Social Sciences in Progress and in Plan. prepared annually by the National Institute of Economic and Social Research, London, and published since Vol.5./1947/48/ by Cambridge University Press /the first 4 Volumes were prepared for private circulation only/ and the Register of Research in the Human Sciences prepared since 1961 by the Warren Spring Laboratory in Stevenage, Herts, in some respects the successor of the former. Both British Registers covered approximately the same disciplines as we intended for the Dutch Register to cover.

The disciplines listed above were the basis for the classification of the research projects in the British Register.

Dutch social science research, originating from Steinmetz's Sociography, was to a considerable extent applied research of an interdisciplinary character. Classification according to disciplines did not work and was not desirable either with an eye on the integration of social science research. A new classification according to large subject areas was set up. This classification is maintained with only minor adaptations. It brings together research projects on the same subject area approached from different disciplines and in this way gives a better opportunity for contacts between researchers from different disciplines interested in the same subject matter.

Not all social science research can be labelled purely scientific. Quite a few of the research projects aim mainly at instant solutions to practical problems. However, it is impossible to make a sharp distinction between fundamental and applied research; the transition from one into the other is gradual rather than abrupt. The only criterion whether or not to enter a research project in the Register should be its usefulness to fellow-researchers. This excludes plain research of limited scientific value.

The Register is very much user-oriented. Social scientists are not served with a description of a research project by subject only. As professor D.F. SWIFT of the Open University, Milton Keynes, U.K. recently 1/ pointed out with respect to multimodal indexing of social science literature, social scientists are also interested in relationships, in study areas, in theories and models, in methods and methodological issues, in assumptions guiding action, in variables and in samples.

In the questionnaires used for the registration of current research projects, information is gathered on these subjects and also on the ways and means used 2/ , format of questionnaires, data processing methods, estimated duration of the research and date when research was started, contemplated way of reporting and extant reports if any, originator of the research project, the financing of it and the possible cooperation with other institutes. In order to make contacts about research project easier, the person to be contacted and his address are specifically mentioned.

These questionnaires are sent to approximately 500 organizations. These are university social science departments and unaffiliated social science institutes, research departments of the central government, provincial and municipal services, private organizations and industrial and commercial organizations. This information-exchange is based entirely on voluntary cooperation. There is no obligation to answer the questionnaires. Response is satisfactory, though.

The registration is still a manual one, the data of the questionnaires are edited, key words are assigned and the draft is typewritten with 3 or 5 carbon copies /depending on 1 or 2 chapters in the classification/ in three different colours. The original is for the printer; one of the copies is for our own file, one for the index according to discipline, and one for geographical index. The assigned key words are punched for a KWOC type of index.

Full information on approximately 250 ongoing research projects is published twice a year in "Informatie omtrent lopend onderzoek in de sociale wetenschappen", a booklet of approximately 100 pages, with 28 chapters of broad subject areas, a list of research institutes and a subject index. Title and research organization of new projects are also recorded in a monthly current-awareness bulletin, "Titels van sociaal-wetenschappelijk onderzoek".

Updating is done about once every 18 months by sending clippings to all the research institutes concerned, inquiring a/ whether the project is still in execution, and if so whether there are already interim reports or other publications concerning the project; b/ whether the project is concluded and if so, whether a report could be sent /or if this is not possible just the bibliographical data of the report/; and c/ whether the project is discontinued.

1/ An International Study Institute, Design and Evaluation of Printed Subject Indexes , Aberystwyth,14th-18th July 1975.

2/ Questionnaires, interviews, group discussions, observations, participation, tests, experiments, official statistics, statistical data collected by the researcher himself, raw data of concluded social science research, files, material from archives, maps, /aerial/ photographs, pictures, sound-tracks, literature, etc.

These data are recorded in the "Register van sociaal-wetenschappelijk onderzoek", Register of social science research in the Netherlands, with a reference to the original full information published in an earlier volume of "Informatie omtrent lopend onderzoek in de sociale wetenschappen". The Register gives titles and sub-titles of the research projects in English, and also a classification and a subject-index in English. It contains also next to the cumulative subject-index, an index of research institutes of the earlier publications concerned, also a geographical classification of all local projects and a classification of the more fundamental projects by scientific discipline. The next Register, due early in 1976, will cover more than 1250 projects.

Users of information on current research and subscribers to the publications are research-institutes as well as policy makers. Evaluation of the impact of this information exchange is not easy, because contacts originated by the information do not go via the information centre but directly from researcher to researcher. Some time after the first Register was published researchers were asked if and how many times they had been contacted because of their projects. Of course, there was a big difference between projects, but as many as 20 times was not an exception.

Besides these informative publications on empirical research, a survey of all theses in course of preparation is published every year, including also the titles of the theses maintained during the previous year.

The integration of the registration of current research into the other services of the Social Science Information and Documentation Centre

Registration of current research projects does not stand by itself. Users are not satisfied with the data on a current research project only. As soon as the project is supposed to be concluded they want to know the results of the project. This required new activities in addition to the registration of current research. While these activities augmented, the registration outgrew the Bureau of the Social Science Council. In the course of some years, out of what was originally one-woman job, the Social Science Information and Documentation Centre-SWIDOC emerged. In 1972 SWIDOC became an independent institute of the Royal Academy, keeping a link with the Social Science Council in its managing Committee. The new activities linked to the registration of current research are:

Bibliographies on social science reports

As was mentioned before the registration was regularly updated. Reports of concluded projects were compiled in special Bibliographies. Along with bibliographical details in these Bibliographies, reference was made to the place where the original project could be found in the registration of current research and this meant that the data entered there could serve as an annotation to the research report, giving just those details Professor SWIFT thinks important in the documentation of social science publications.

These bibliographies are compiled with the same classification used for the registration of current research. They also contain a detailed key word index.

Lending library of research reports

Most research reports are not published by publishing firms, they cannot be purchased in book-shops, and even most libraries do not have them. Many are cyclostyled /duplicated/ in a small edition and distributed among colleagues. Even when dissemination of information on research reports is satisfactory by the publication of special bibliographies it is often quite difficult to obtain a copy.

To meet this difficulty a lending library of research reports was established in 1969 based on voluntary cooperation. Every research institute or researcher was asked to present SWIDOC with a copy of their reports to be entered into the lending library, where they can borrow their colleagues' reports also. In this way the lending library has a collection of more than 4000 research reports. Moreover, more than 1250 doctorate dissertations in social and behavioural sciences are entered into the lending library by the library of the Royal Academy, where a copy of every dissertation maintained in the Netherlands is received.

In the lending library the numbers of the research reports are based on the registration numbers originally given to the ongoing research project. In this way all partial and interim-reports and the final report, published sometimes in the course of a number of years by sometimes different authors, come together under one number, giving access to the data of the ongoing research project as a useful annotation.

Retrieval of social science literature

An investigation in 1966 on the dissemination of information on social science literature in general revealed that in the Netherlands, scores of documentation departments within ministeries and other governmental bodies, in university departments and research institutes, in private organizations and in industrial organizations were active in the documentation of social science literature because the international bibliographies and abstract journals are considered to be rather slow, and what is still worse, very incomplete on Dutch literature. This is more pressing for social science research and social policy than, for example, scientific research, because it is precisely in the field of social science that the national literature is of great importance. Quite a few of these documentation activities were overlapping each other, causing double work for the documentation services and leading to a confusing situation for the user, who could hardly be expected to find his way in a labyrinth of documentation centres.

An investigation in 1969 on the use of social science literature by social scientists revealed that social scientists were not too eager to make use of the extant documentation. About 70% of the social scientists never went to a documentation centre or asked a librarian for literature on his subject; most of them retrieved their literature in a haphazard manner from colleagues or from footnotes in relevant publications. This often does not result in getting the most complete or most recent information.

The conclusion of both investigations was that a nucleus of information was needed, where social scientists could gather information on where to find the literature they were looking for. The Social Science Information and Documentation Centre, already a nucleus of information on social science research in the Netherlands, is meant to be such a referral centre. Data were gathered on all libraries and documentation centres dealing with social science literature, with respect to the scientific disciplines and subjects they cover. With a number of more technical details, these were published in a "Wegwijzer Maatschappijwetenschappen; bibliotheken en documentatie-instellingen" /Guide to the libraries and documentation services for the Social Sciences/. Information is given to users out of the Centre's own files, and quite a few documentary bulletins are ready for use at the Centre, but for more complete information users can be referred to the most likely documentary publication or documentation service to solve their information problems.

Access to on-line retrieval systems for international literature is contemplated for next year.

In 1964 a data archive, the Steinmetz Archives, was founded with a view to secondary analysis of the raw data of concluded research projects. In 1972 the Steinmetz Archives was affiliated with the Social Science Information Centre. It holds more than 400 studies now, most of them available in SPSS /Statistical Package for the Social Science/ files. The Steinmetz Archives

Catalogue and Guide gives ample information on these studies. Assistance in the execution of secondary analyses is given by staff members. An automated retrieval system on descriptive data and on every single question of the study has been installed. The acquisition of studies is based on the extant data on data processing, sample, etc., in the registration of current research.

On the initiative of SWIDOC, a current-contents monthly on approximately 100 Dutch periodicals on social science and social welfare has been founded. As the chief editor, SWIDOC receives all these periodicals, which makes it possible to add relevant articles to the documentation of research reports. A computer-produced author index and subject index is contemplated. This would greatly add to the accessibility of Dutch social science literature.

All these activities are strongly interrelated. Concentration of these activities in one Centre means that an overall picture of social science research is available there. Owing to this overall picture, the Centre has grown to be a real nucleus of information on social science research in the Netherlands.

The dissemination of information on information

Social scientists do not walk a long way to gather their documentary information. The investigation of 1969 mentioned above, revealed that the most popular method of retrieving literature was talking to friends and looking for footnotes. The most frequented library was that of the social scientist's own institute, followed by the university library and his own bookshelves.

A Social Science Information and Documentation Centre therefore has to meet the social scientist at least half-way and make it easy to be consulted. Just about all the information gathered at SWIDOC is published; collaborating research institutes and individual researchers have reduced rates in buying these publications. Many institutes subscribed to these publications. This proved not to be enough, however. For quite some time the lending library and the literature information service were underused. Social scientists affiliated with cooperating institutes proved to be unaware of SWIDOC's facilities, or sometimes even of its existence.

SWIDOC's publications and annual reports were entered in the libraries, but unless the librarians drew the attention of new collaborators to their usefulness only relatively few used them. Two years ago a monthly current-awareness bulletin "Titels van Sociaal-Wetenschappelijk Onderzoek" /Titles of social science research/ was set up and sent free of charge to approximately 3000 social scientists in research institutions and government agencies. Apart from an ocassional announcement it does not give more than title, research institution and researcher of all newly registrated current research projects, of all reports entered into the lending library, and of all studies entered into the Steinmetz Archives. Everybody receives it on his own desk, can study it in his own armchair and ask for reports by telephone.

The use of the lending library has been multiplied several times since then, more researchers present their reports without being asked for and do consult the Centre much more than they did before. Not only in the lending library the report literature is consulted much more than before; many users also try to obtain their own copy of a research report at the research institutions. The dissemination of information on research results has been strongly stimulated by this very simple leaflet.

Of course, one might argue that social scientists should take the trouble of retrieving their literature on their own, and not be spoiled by information services. As I explained before social scientists are not too much motivated to take these troubles. As long as we believe that better literature-awareness results in better social science reports for the benefit of society as such, we believe in offering these services.

Epilogue

Apart from the Steinmetz Archives the system employed by SWIDOC is still manual. It might be installed in every country with little cost. The number of research projects and research reports in the Netherlands has not exceeded 10 000 in these 11 years. /There are some advantages in living in a small country/. Information is still tailor-made. For a country with many more projects computerisation will be indispensable. For the analysis of the many data entered into our system though, and also for retrieval purposes, we are now envisaging a computerised system. We would prefer to wait until we can join an international retrieval system, to make international exchange of information more feasible.

We made a first draft of a translation of Jean VIET's "Thesaurus for information processing in Sociology" to try to apply this to our system, but we see quite a few difficulties ahead. Computerised or not, for national use the integration of all information on research, current and concluded, including the raw data, and of information on information resources is of utmost importance.

The limit of the optimal size of such an information service has to be considered. As long as the system does not depend on obligatory registration, obligatory deliverance of reports and raw data /and even then/, voluntary cooperation with researchers is of utmost importance. This voluntary cooperation is largely stimulated by a personal approach. This is the reason why this kind of integrated information service cannot grow infinitely.

As soon as an integrated information service has reached its optimal size, a choice will have to be made between, on the one hand, the integration of the different kinds of service, and on the other, the integration of the different disciplines of the social and behavioural sciences. Though the latter is very important indeed, in my view parallel interlinked integrated services for various disciplines are to be preferred above scattered services for the whole field of social and behavioural sciences.

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Bulgarian Academy of Sciences,
Bulgaria

Session III
Part 3
Paper 32

Summary

MEETING THE USER NEEDS OF ONGOING RESEARCH INFORMATION IN BULGARIA

The organizational structure of the Bulgarian National System for Scientific and Technical Information, with a special stress on its services aimed at meeting the user needs of ongoing research information, is outlined.

The major groups of users in need of this type of information are defined:

1. Top party and government organs - decision makers in the technical economic and science policy of our country;
2. Research workers, constructors and project makers - responsible for channelling research in progress;
3. Specialists concerned with transferring into practice and application of scientific and technical achievements

The significant impact of the Bulgarian Library Network in studying and meeting the user requirements of ongoing research information is emphasized.

Resumé

COMMENT ON REPOND EN BULGARIE AUX BESOINS DES UTILISATEURS EN MATIERE D'INFORMATION SUR LES RECHERCHES EN COURS

L'auteur esquisse la structure d'organisation du Système national bulgare d'information scientifique et technique, en insistant plus particulièrement sur les services qu'il offre pour répondre aux besoins des utilisateurs en matière d'information sur les recherches en cours.

On peut distinguer trois grands groupes d'utilisateurs ayant besoin de ce type d'information:

1. Instances supérieures du parti et du gouvernement, à savoir les responsables de la prise des décisions en matière de politique scientifique et économique du pays;
2. Personnels de recherche, de construction et d'élaboration des projets, à savoir les responsables de l'exploitation des recherches en cours;
3. Spécialistes chargés de mettre en oeuvre et d'appliquer les résultats de la recherche scientifique et technique.

On note la place importante que le Réseau bulgare de bibliothèques occupe dans l'étude et la satisfaction des besoins des utilisateurs en matière d'information sur les recherches en cours.

MEETING THE USER NEEDS OF ONGOING RESEARCH INFORMATION IN BULGARIA

E. SAVOVA

The present large-scale social and economic development of our country put another major task before all creative collective bodies and specialists: the necessity of a complete and timely mastering of the worldwide scientific experience for its routine application to practice.

In response to the social demand for timely information, and due to the concerns of the Bulgarian Communist Party and the People's Government, a unified National System for Scientific and Technical Information /NSSTI/ has been set up, under the guidance of the Committee for Science, Technical Progress and Higher Education /CSTPHE/. The system comprises all the information centres and libraries from the Unified Library System. The organizational structure of the NSSTI is the following:

1. The Central Institute for Scientific and Technical Information /CISTI/ - a general national information organ /subordinated to the Committee for Science, Technical Progress and Higher Education/, whose main responsibility is the establishment of a National Automated System for research and development management and aiming at:"supplying all organs of social management, scientific and technical development and production with information on the state-of-the-art and development of science, technology and economy" /Decree No.8 of the Central Committee of the Bulgarian Communist Party and the Council of Ministers, 15th March 1973/.

2. National Information Bodies, such as:

- Centre for Scientific Information and a Central Library at the Bulgarian Academy of Sciences;
- Centre for Scientific, Technical and Economic Information on Agriculture and Forestry;
- Centre for Scientific Medical Information; and
- Centre for Scientific and Technical Information on Architecture and Building.

3. Branch Specialized Information Centres, attached to different institutions, research institutes and big industrial enterprises.

Networks of information units attached to the above information bodies effectively meet the specialized needs of the users dealing with science and production.

4. Approximately 1500 special scientific libraries, headed by the Cyril and Methodius National Library in Sofia, provide their services in complete coordination with the whole National Information System /See Annex 1./.

All the above information bodies have already stored a rich information stock and publish regularly a number of reference materials addressed to the specialized users. One of their major responsibilities is the search and supply of information on world achievements relevant to the problems of the individual working groups, thus using the strategy of the selected dissemination of ongoing research information, one of the main tasks of the information system as a whole.

This type of information flow is of two-way character: the user expects to receive information on research activities abroad and at home, but on the other hand he is to exchange his own achievements and foreseeable scientific results.

Managerial and scientific users of ongoing research information in Bulgaria

Out of the nine million Bulgarian people, about 66 000 are engaged in scientific activities, out of which 17 500 are research workers at academies, institutes, etc. Their number is 4000 at the Bulgarian Academy of Sciences alone. There are 24 higher educational institutions in Bulgaria, functioning with 8908 teaching personnel and 103 515 students. This scientific potential - big enough for the size of our country - is in a current need of daily information on the worldwide, ongoing research and achievements which would aid in the prompt application to practice of both the foreign and our own scientific results.

The users of ongoing research information relating to the scientific, technical and social-economic development of our country are grouped in three main categories:

1. Top party and government organs responsible for making decisions in particular areas of the technical, economic and science policy on all levels: national, branch, local, etc.;

2. Research workers, constructors, designers and project-makers responsible for channelling research in progress in certain subject areas;

3. Specialists applying to practice the ongoing research achievements and carrying out some organizational and technical projects.

This categorization is often more deeply differentiated on the basis of collected data concerning the professional specialization, education, length of service, language qualification, etc.

Studying the information needs

The information needs fall exclusively within the scope of the ongoing research problems and a complete registration of the research activities in our country is duly made, with some essential entry components: individual or collective author, time of completion, foreseen results, etc.

The information-bodies are in search of published and unpublished literature relating to the goals of research underway and provide the specialists with selected information, depending on their specific needs. In implementation of these objectives, all resources available are currently analyzed, and information is selected and processed in reviews or synthesized in abstracts or other forms.

This information is made available in different publications: abstract journals /about 98/, reviews, bibliographic series etc. The number of the bulletins specializing in ongoing research information highly increased recently /See Annex 2./, a significant achievement of our information organs, whose efforts are effectively coordinated with the requirements of the users working in different fields of science and production.

The great importance of these publications is to be emphasized, since they treat the most pressing problems and provide the up-to-date information necessary for practical use. It has been ascertained that about 43% of the innovations put into practice are a result of scientific and technical information exchange. The operational qualities of different subject files are also appreciated: ongoing research, translations and prognosis files are currently kept in almost every information body, for quick response to the users' inquiries.

We dare say that a multi-branch scientific information system has been already established in Bulgaria and succesfully operates with a rich information store, trying to meet completely the needs of all categories of users through a strict division of labour among the information bodies of all levels and the coverage of the world literature exhaustively by subject in all fields of science, technology and economy. This is mainly the result of the fact that we can rely easily on the powerful and complete arsenal of the Soviet scientific and technical information, led by the world-renowned All-Union Institute of Scientific and Technical Information /VNTC/ , which covers 86% of the world literature, and on the International Centre for Scientific and Technical Information at the CMEA in Moscow, in which the PR of Bulgaria participates reciprocally. Through these information systems we readily find information on research in progress in all socialist countries.

The significant role of the library networks at various institutes and industrial enterprises has to be stressed:a major store of all types of published and unpublished information is available. A library is well-acquainted with its users, possesses strictly specialized stocks, keeps up-to-date collections and files of preprints, dissertations, conference papers and other materials comprising data about recent scientific achievements.

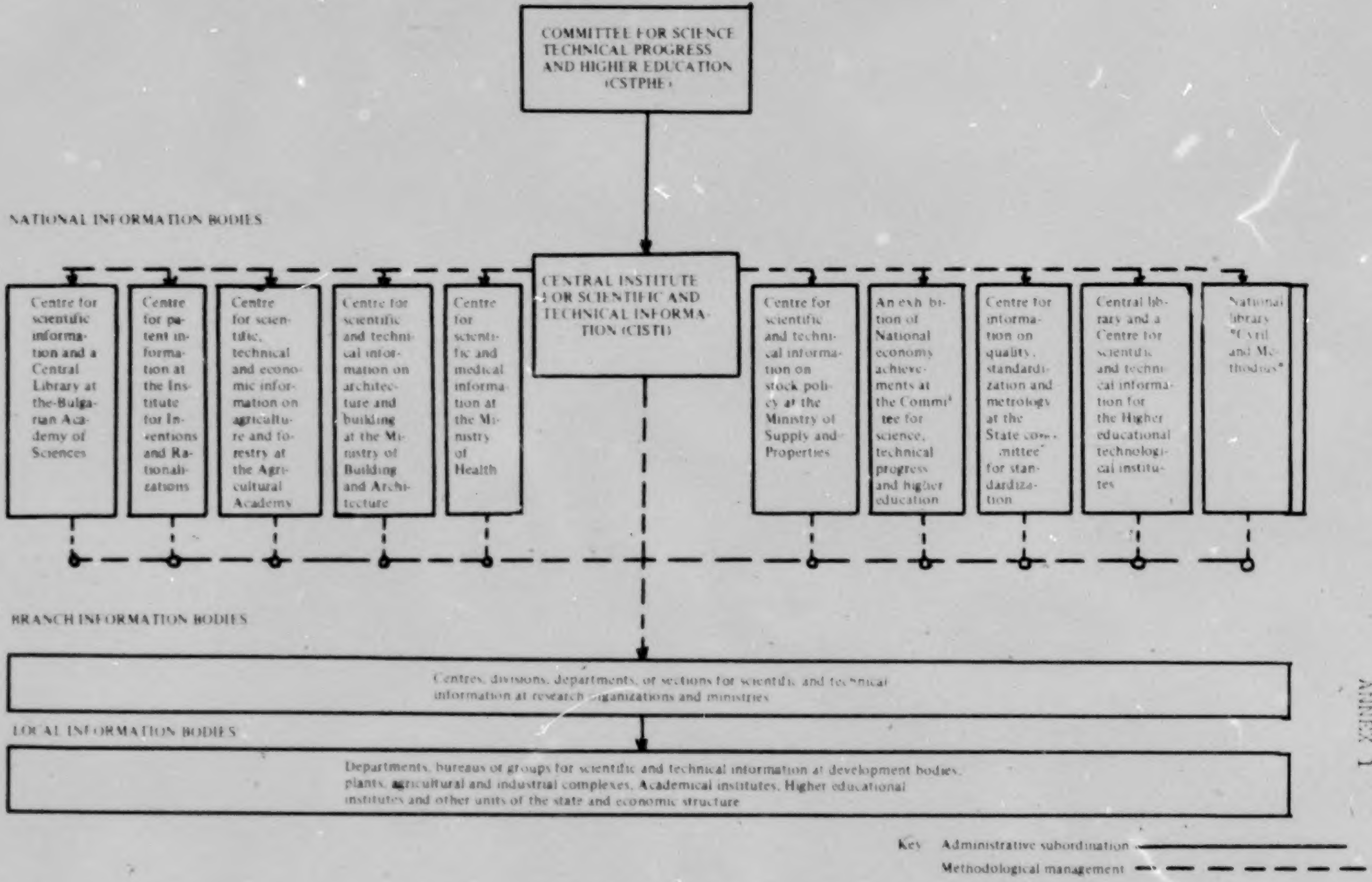
There are information systems successfully operating in the library network of the Bulgarian Academy of Sciences. The two libraries at the Central Laboratories at the Institutes of Biophysics and Biochemistry are good examples of such well-established systems, based on a specialized store of reprints. The information stock is made fully available to the users and the information system is completely integrated with the acquisition system: orders for reprints of the most interesting and valued titles are placed simultaneously with the information cards. In case of failure in this respect, the acquisition services try to collect photo and xerographic copies or microfilms. The reproducing technique of the National Interlibrary Lending System is also used.

UNESCO's assistance in solving our problems connected with the building up of the Bulgarian National Information System deserves renewed acknowledgement: the recommendations of Mr. A. MAKENZI, an expert on mechanization and automation of library and information processes, commissioned to Bulgaria in 1969 by the initiative of the Bulgarian Academy of Sciences, are still being used. The setting up of an automated system for management of library and information service in coordination with the UNISIST activities and the International Centre for Scientific and Technical Information at CMEA in Moscow is still in progress. Standard formats, compatible with the USSR pre-machine communicative format and the MARC II and the International Standard Formats are being worked out.

The P.R.of Bulgaria participated actively in the establishment of the International Automated System for processing and retrieval of patent information from the Socialist countries and in the International Information System for Scientific and Technical Films.

The envisaged utilization of computer techniques and an integration with the existing international systems for ongoing research information exchange will open up new possibilities for the Bulgarian National Information System in implementation of its major task - to serve the leading government bodies and meet, to the utmost extent, the ever-increasing information needs of the Bulgarian scientific community.

ORGANIZATIONAL STRUCTURE OF THE NATIONAL SYSTEM FOR SCIENTIFIC AND TECHNICAL INFORMATION (NSSTI)


COMMITTEE FOR SCIENCE TECHNICAL PROGRESS AND HIGHER EDUCATION (CSTPHE)
NATIONAL INFORMATION BODIES
CENTRAL INSTITUTE FOR SCIENTIFIC AND TECHNICAL INFORMATION (CISTI)
Centre for scientific information and a Central Library at the Bulgarian Academy of Sciences
Centre for patent information at the Institute for Inventions and Rationalizations
Centre for scientific, technical and economic information on agriculture and forestry at the Agricultural Academy
Centre for scientific and technical information on architecture and building at the Ministry of Building and Architecture
Centre for scientific and medical information at the Ministry of Health
Centre for scientific and technical information on stock policy at the Ministry of Supply and Properties
An exhibition of National economy achievements at the Committee for science, technical progress and higher education
Centre for information on quality, standardization and metrology at the State committee for standardization
Central library and a Centre for scientific and technical information for the Higher educational technological institutes
National library "Cyril and Methodius"
BRANCH INFORMATION BODIES
Centres, divisions, departments, or sections for scientific and technical information at research organizations and ministries
LOCAL INFORMATION BODIES
Departments, bureaus or groups for scientific and technical information at development bodies, plants, agricultural and industrial complexes, Academical institutes, Higher educational institutes and other units of the state and economic structure
Key
Administrative subordination
Methodological management

Issued by CISTI

ANNEX II

BULGARIAN PUBLICATIONS RELATING TO ONGOING RESEARCH INFORMATION

Central Institute for Scientific and Technical Information

Series of Information Bulletins

Abstracts of Papers from Scientific Conferences and Symposia held in Bulgaria
Calendar for Conferences and Symposia to be held in Bulgaria
Abstracts of Bulgarian Scientific Literature - industry, building and transport
Catalogue of the Publications of the Information Organs in the PR of Bulgaria
Reference Book of the Periodicals Subscribed by the Scientific and Technical Libraries in the Country
Bulletin for the Newly Received Firm Literature in CISTI

Centre for Scientific Information and Central Library at the Bulgarian Academy of Sciences

Science Organization and Management - express information
Science Organization and Management - Signal Bulletin
Pressing Problems in Science
Academies and Universities Abroad - Information Bulletin
Bulletin of the Bulgarian Academy of Sciences

Academy of Social Management

Social Management Bulletin
Series of Signal Bulletins

Centre for Scientific Medical Information at the Ministry of Health

Information Bulletins on General Medicine
Abstracts of Bulgarian Scientific Medical Literature
Current Information on Foreign Publications Received in Bulgaria
About 16 Specialized Information Bulletins
About 16 Scientific Medical Reviews

Centre for Scientific, Technical and Economic Information on Agriculture and Forestry at the Agricultural Academy

Bulletin of Innovations in Help of the Agricultural Practice - in several series

Bulletin of Innovations in Help of the Forestry Farming Practice - in several series

Abstracts of Bulgarian Scientific Literature on Agriculture, Forestry and Veterinary Medicine.

Centre for Scientific and Technical Information on Architecture and Building at the Ministry of Building and Architecture

Building and Architecture - Information Bulletin

Information for the Constructor and Designer

Note Many other ongoing research publications in Bulgarian and foreign languages are issued by Branch and Local Information Centres attached to the research institutes, libraries, directorates, departments, etc.

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Session III

Part 3

Paper 33

Summary

THE MACROTHESAURUS
A NEW INSTRUMENT WITH WHICH TO INDEX MULTIDISCIPLINARY
DATA BANKS

To get over the problem of the representation of multidisciplinary research projects, a new linguistic aid has been devised, the Macrothesaurus.

Its aims and mode of preparation will be described followed by details of the essential principles of its structure and of the results of some trial applications.

Résumé

LE MACROTHESAURUS
UN NOUVEL INSTRUMENT POUR LA DESCRIPTION DES PROJETS
DE RECHERCHE

Pour permettre de résoudre le problème de la représentation des projets de recherche multidisciplinaires, un nouvel outil linguistique a été conçu: le Macrothésaurus.

Ses objectifs ainsi que son mode d'élaboration seront exposés, les principes essentiels de sa structure seront ensuite détaillés ainsi que les résultats de quelques essais d'application.

THE MACROTHESAURUS
A NEW INSTRUMENT WITH WHICH TO INDEX MULTIDISCIPLINARY DATA BANKS

M. WOLFF-TERROINE - S. PLANTE

All scientific research is a fruit of two major forms of intellectual enquiry: the first consisting in a thorough scrutiny of the problems encountered in a specified field, and the second in the discovery of points of similarity between questions which had hitherto been considered discretely, and without reference to possible areas of relationship.

The management of a data bank of current research is thus an occasion of confrontation with the two principal modern approaches in research: specialization and "multidisciplinarity".

This implies that the system of characterization of research projects,i.e. the documentary langugage of such a data bank, must harmonize two contradictory necessities, those of specialization and multidisciplinarity.

In order to satisfy this need, the idea occurred to us to fashion a documentary language common to the totality of sciences and techniques and which was in a position to reflect, on a rather high level of generality, all preoccupations appertaining both to scientific and technical fields and which would be suitable for revealing the areas in which the fields in question overlapped. This language, styled a macrothesaurus, must be an implement apt to ensure communication between different systems of specialized information.

Basic principles of the macrothesaurus

The fields covered by the macrothesaurus are as follows: mathematical, physical, biomedical, terrestrial and space sciences, industrial and agricultural techniques and general sciences such as cybernetics, methodology or security. The social sciences are only represented to the extent that they interact with scientific fields; this proves notably to be the case with law, economics and political geography.

This macrothesaurus is evidently the creation of a working team which addressed an appeal to numerous specialists, both information scientists and others, either to assist in drawing up the macrothesaurus or to test its performance.

The total number of preferential descriptors of the macrothesaurus is approximately 5000, a relatively low figure; it seemed to us, nevertheless, indispensable to accept such a limitation if we wished to devise a readily workable instrument.

These three fundamental imperatives /a limited number of terms, compatibility between the fields covered, and their possible articulation/ have shaped the structure of the macrothesaurus.

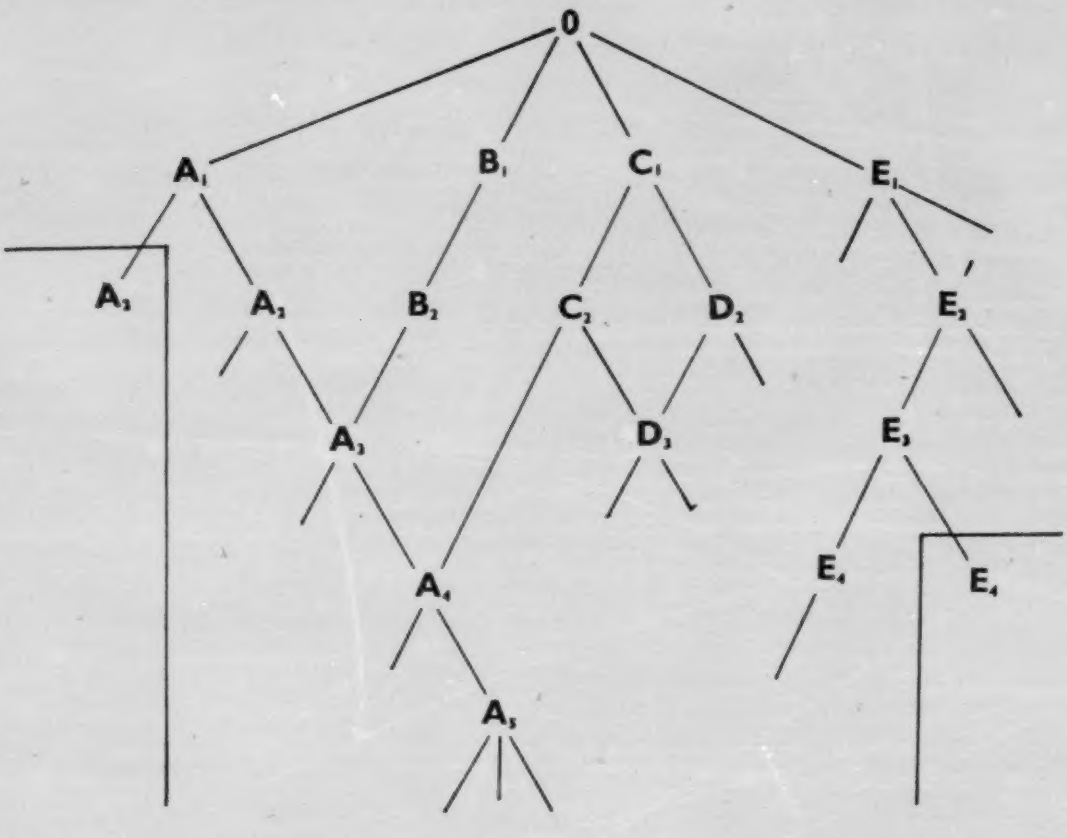
The medium level of generality of the macrothesaurus descriptors is that which should allow rapid indexing, but not indexing in depth.

The descriptors chosen were sufficiently general so as to prove adaptable to a set of different but associated fields: the possibility of subsequent creation of combinations between them multiplies the number of available concepts but precoordinated descriptors are shunned.

The level of generality will be variable according to the sectors:

- it can sink rather low when the representation of concepts common to several fields is involved;
- it will remain high, on the other hand, in the case of very particular fields which have little interaction with others;
- it will be equally high in the case of quite closely related fields apparently disposing of an analogous vocabulary, but constituting in reality very special "jargons".

In these two cases the "nuclei" of specialized languages could come to be grafted on the branches of the general schema. This way the macrothesaurus could serve as a clue to the drawing up of future sectorial thesauri of a guaranteed compatibility between their common constituents.

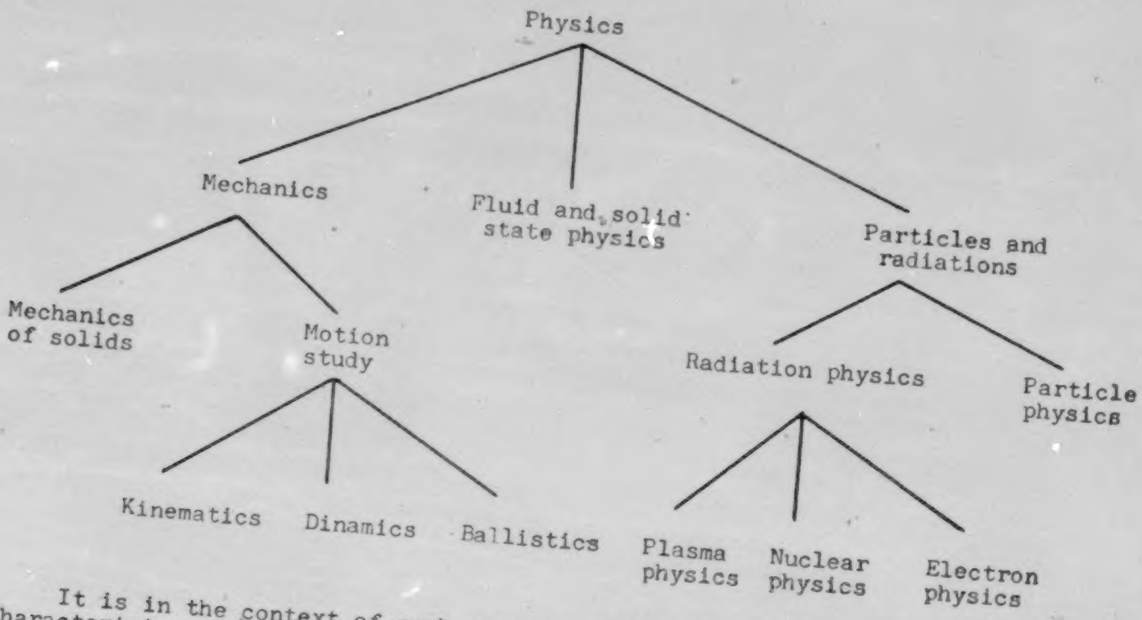


Structure of the macrothesaurus

Structure of the macrothesaurus

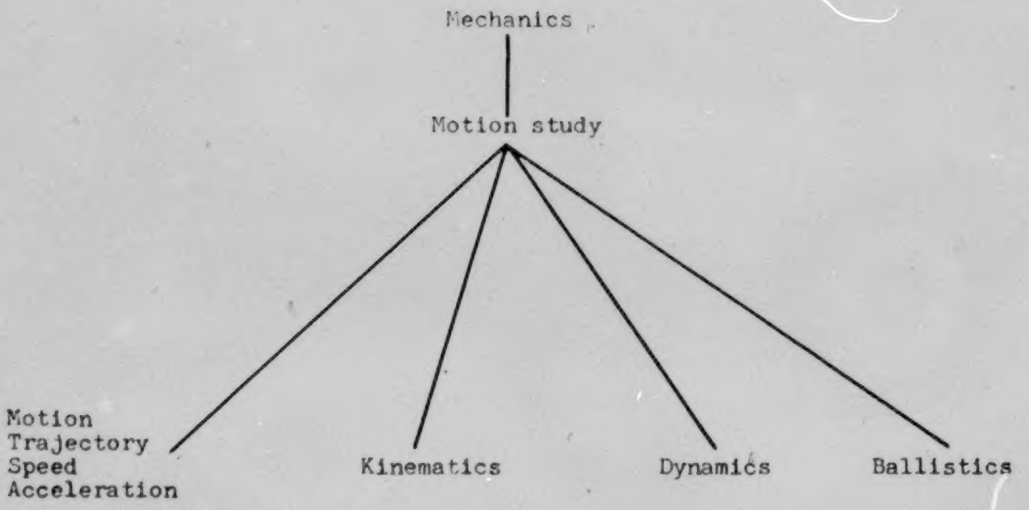
At the beginning we were torn between an organization by facets and an organization in terms of hierarchical topics. After looking at the extant thesauri, we came to the conclusion that there was little agreement as to the nature of the facets and that moreover as far as the users of the macrothesauri were concerned, a structure determined by themes of knowledge would be more convenient to apprehend and to use.

The structure of the macrothesaurus is consequently a hierarchical thematic structure: the scientific and technical fields are interrelated according to a strict hierarchy. /The rigidity of the hierarchy is compensated for by the introduction of polyhierarchies, cf. p.328/.


Physics
Mechanics
Fluid and solid state physics
Particles and radiations
Mechanics of solids
Motion study
Radiation physics
Particle physics
Kinematics
Dinamics
Ballistics
Plasma physics
Nuclear physics
Electron physics

It is in the context of such a schema that the descriptors intervene characterizing each of these fields: linked up by a hierarchical relationship with the "branch" head, they are equally the subject of a mutual hierarchical organization /which is a procedure differing from those of other "general" thesauri, e.g. the TEST/.

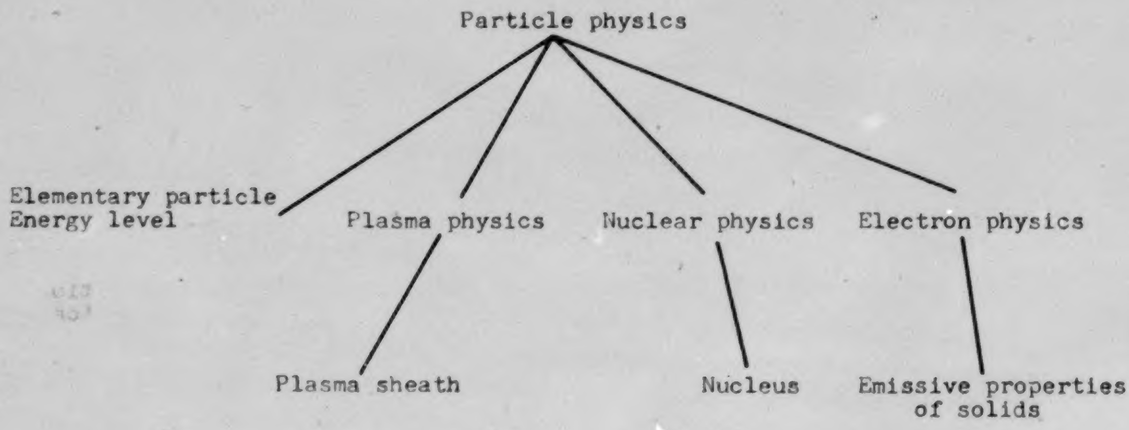
It might usefully be stipulated that the descriptors brought together within a field or subfield are strictly specific to that field, i.e. that they are logically linked with that field and it alone. When several fields are concentrated within the same set of concepts the terms designating these concepts are situated at the highest level of generality possible. The terms "movement, trajectory, speed, acceleration", for example, are equally valid in kinematics, dynamics and ballistics. Kinematics studies these concepts without predetermining their causality, dynamics on the other hand introduces the idea of force, and ballistics that of application. The semantic field which corresponds to these disciplines can be represented in the following fashion.


Mechanics
Motion study
Motion
Trajectory
Speed
Acceleration
Kinematics
Dynamics
Ballistics

Likewise, "population characteristics" such as age, mortality, behavior, etc., will be situated at a rather high level so as to belong to a field common to demography, population dynamics and physiology.

Certain cases can be more complex. In regrouping terms belonging to "Particle Physics", for instance, a group of terms will be shared by different subfields, others will prove specific to only one of them.

Their representation will then take the following form:


Particle physics
Elementary particle
Energy level
Plasma physics
Nuclear physics
Electron physics
Plasma sheath
Nucleus
Emissive properties of solids

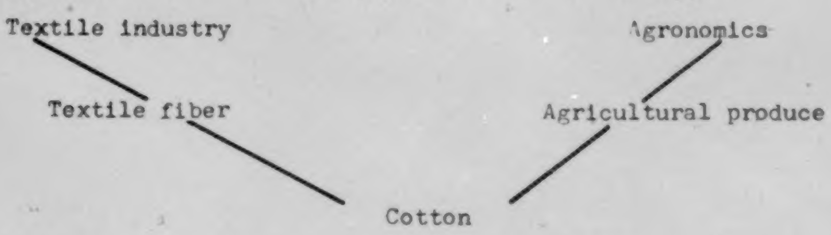
The thematic organization is reflected up to the highest level and entails the adoption of the system of "classes of equivalents": in this event, sets of intimately associated concepts, which make up in reality microfields, are represented by a single descriptor. In the most complete cases the same term could signify simultaneously a technique, an operation and its result.

Polyhierarchies

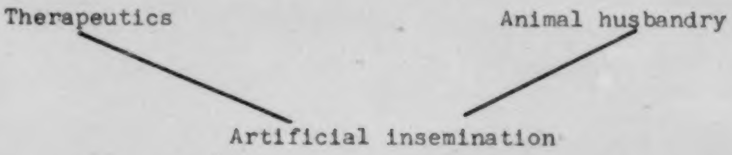
Numerous descriptors belong logically to several fields, often representing different perspectives. A classical thesaurus makes a selection among these various points of view. The macrothesaurus, placed before the obligation to admit the points of view of all the disciplines represented, took the option of creating polyhierarchies.

It is thus possible to disclose multiple and pertinent relationships:

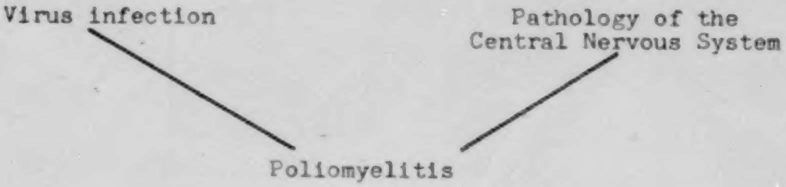
- the theoretical point of view and that of its application;
- the point of view of the producer and that of the user:


Textile industry
Agronomics
Textile fiber
Agricultural produce
Cotton

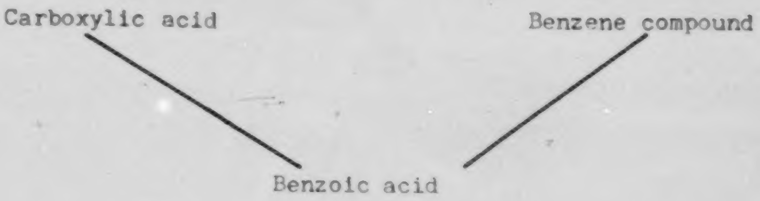
- different applications:


Therapeutics
Animal husbandry
Artificial insemination

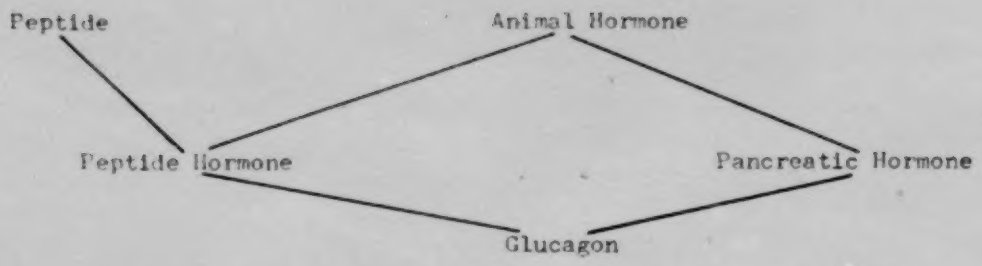
- an illness can accordingly be considered in terms of its aetiology and its anatomical localization:


Virus infection
Pathology of the Central Nervous System
Poliomyelitis

- an organic compound can appear with reference to its chemical function or its chemical structure, the nature of its components or of the radicals which constitute it, the form of its chain:


Carboxylic acid
Benzene compound
Benzoic acid

- a hormone is considered in function of its chemical constitution, its physiological role and the locus of its synthesis:



It should be noted that in practice the number of terms which figure in polyhierarchies is rather restricted, and moreover, that no more than four polyhierarchies are presented with reference to the same term; the danger of the multiplication of hierarchies which could have rendered the macrothesaurus too difficult to manipulate has thus been definitively exorcised.

The utilization of a polyhierarchy is not free from difficulties, however. In point of fact, terms which belong to different hierarchical trees can possess themselves specific terms which are not valid for each of the trees in question.

For instance, the term:

WATER, has several generic terms

CHEMICAL COMPOUND

NATURAL RESOURCES

The specific terms, however, of WATER, such as DRINKABLE WATER, or SURFACE WATER, corrspond to the field of NATURAL RESOURCES and not at all to that of CHEMICAL COMPOUNDS. We were thus led to construct a program of administration of the thesaurus which would enable us:

- to bring into prominence in each hierarchical tree uniquely the specific terms proper to it :

CHEMICAL COMPOUND
. WATER
.. HEAVY WATER
NATURAL RESOURCES
. WATER
.. SURFACE WATER
.. SEA WATER
.. DRINKABLE WATER

- to diversify the specific terms according to their hierarchical origin in the alphabetic edition:

WATER
B.T. CHEMICAL COMPOUND /1/
B.T. NATURAL RESOURCES /2/
N.T. /1/ HEAVY WATER
N.T. /2/ SURFACE WATER
SEA WATER
DRINKABLE WATER

Choice of preferential terms

Another signal difficulty can be ascribed to the fact that identical concepts are susceptible to a difference of formulation according to the fields invoked, and that with some terms there is no possibility of objective justification of a choice favoring one mode of expression over another.

For example: Electron beam welding
Electron bombardment furnace

signify the same form of energy but one of the other of these locutions will be employed according to the technique under consideration.

Similarly, perfectly identical concepts in anatomy or physiology receive different expression according to their use in relation to man or the animal kingdom:

Delivery and dropping
Upper limb and forelimb

Examples could readily be multiplied.

In this context again, the thesaurus, to be comprehensible and thus actually consulted, must accept the imposition of limits on its task of normalization. We accordingly made the decision to exlude the possibility of fixed preferential terms: programs were set up which make it possible in hierarchical presentation /that is to say, the presentation by fields/ to respect the speciality of the nomenclature proper to each field in question.

Presentation of the macrothesaurus

The macrothesaurus, as is the case of the majority of thesauri, takes the form of an alphabetic and a hierarchical /i.e. thematic/ edition.

The alphabetic edition is classical: each descriptor makes its appearance with its generic, specific, associated and synonymous terms. Notes giving its application are in a position to specify the meaning of the term or to advance indications for the coordination of terms whose association is less than evident.

PHYSICAL NUCLEAR REACTOR CHARACTERISTICS
such as reactivity, period
BT = nuclear reactor

ARSENIDE
descriptor to be used alone or associated with the chemical element when the concerned arsenide is not in the thesaurus.
BT : ide
NT : Aluminium Arsenide

ACOUSTIC REFRACTION
USE: Wave refraction + acoustic wave

REFRACTION WAVE
Specify the nature of the wave
BT: wave propagation
NT: birefringence.

Under the heading of each descriptor can be found an indication localizing the pagination of the hierarchical edition in which the descriptor appears: this obviates the often tediously protracted quest for the exact placement of a term in a branching structure.

In the alphabetic list, thanks to a KWIC-type program, can be found the terms which are the fruit of a permutation effected on the descriptors constituted by several words.

Biological productivity primary see primary biological productivity
Biology aquatic see aquatic biology
Biology radiation see radiation biology

The hierarchical edition brings into prominence the general structure of the macrothesaurus. Its major part is devoted to sciences and techniques with their specific descriptors. A common field of general terms is revealed on the same occasion.

Among these general terms can be found:

- general terms with a precise signification in themselves and capable of being employed in all sciences: marking, filling, etc.
- general terms, useless out of context, which specify the meaning of a descriptor and reduce irrelevant references in the course of an enquiry: theory, mode of operation, etc.
- an enumeration of the materials, subjected to classification according to the industry which produces or transforms them and equally according to their function, composition, etc.

Material

- Agricultural and food product
  - starch and amyloide product
  - alcoholic drink
  - . . .
- Product of ceramic industry
  - brink /material/
  - ceramics
  - enamel
  - . . .
- Product by form or composition[x]
  - alveolar
  - composite material
  - reinforced material
  - . . .
  - bar
  - block
  - . . .
- Product of animal origin
  - animal wax
  - animal grease
  - wool

. . . .

- Material by physical aspect
  - granular material
  - . . .
- Material by composition
  - wax
    - animal wax
    - vegetal wax
  - tar
  - . . .
- Material by purpose
  - additive
    - food additive
  - dye
  - fertilizer
  - . . .

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[x] non-descriptor titles

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SCIENCES MATHEMATIQUES

    .MATHEMATIQUES
         .ALGEBRE
              .ALGEBRE COMMUTATIVE
              .ALGEBRE DE BANACH
              .ALGEBRE DE BOOLE
              .ALGEBRE DE LIE
              .ALGEBRE HOMOLOGIQUE
              .ALGEBRE LINEAIRE ET MULTILINEAIRE
                   .THEORIE MATRICE
              .ALGEBRE NON COMMUTATIVE
              .ALGEBRE TOPOLOGIQUE
              .CORPS (MATHEMATIQUES)
                   .ANNEAU (MATHEMATIQUES)
                        .THEORIE DES GROUPES
                             .GROUPE ALGEBRIQUE
                             .GROUPE CLASSIQUE
                             .GROUPE DE LIE
                             .GROUPE FINI
                             .GROUPE TOPOLOGIQUE
                   .ARITHMETIQUE CORPS ALGEBRIQUE
              .GEOMETRIE ALGEBRIQUE
              .THEORIE CATEGORIE
         .ANALYSE NUMERIQUE
              .APPROXIMATION
              .CALCUL MATRICIEL
              .CALCUL OPERATIONNEL
              .INTERPOLATION
              .LISSAGE
              .NOMOGRAPHIE
              .QUADRATURE
              .RESOLUTION D'EQUATION
         .ANALYSE (MATHEMATIQUE)
              .ANALYSE COMPLEXE
                   .FONCTION DE VARIABLE COMPLEXE
                   .THEORIE POTENTIEL
              .ANALYSE DE FOURIER
              .ANALYSE FONCTIONNELLE (MATHEMATIQUE)
                   .ESPACE FONCTION
                   .ESPACE LINEAIRE TOPOLOGIQUE
                   .THEORIE DES APPROXIMATIONS
                   .THEORIE INTERPOLATION
              .ANALYSE REELLE
              .CALCUL DES VARIATIONS
              .CALCUL DIFFERENTIEL
              .CONVERGENCE
              .EQUATION
                   .EQUATION A DERIVEES PARTIELLES
                   .EQUATION DIFFERENTIELLE
                   .EQUATION FONCTIONNELLE
                   .EQUATION INTEGRALE
                   .SYSTEME D'EQUATIONS
              .FONCTION (MATHEMATIQUE)
                   .FONCTION [illegible]
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HIERARCHICAL STRUCTURE OF THE MACROTHESAURUS.

Non-descriptor titles are frequently employed to render more explicit the structure latent in conceptual regroupings thus faciliting the consultation of the macrothesaurus.

- Organic compound
  - Organic compound by chemical function[x]
    - Acid
    - Ketone
    - . . .
  - Organic compound by saturation of the C-C bonds[x]
    - saturated compound
      - saturated aliphatic hydrocarbon
    - unsaturated compound
  - . . .
  - Organic compound by chemical structure[x]
    - hydrocarbon
      - aliphatic hydrocarbon
        - saturated aliphatic hydrocarbon
        - . . .
    - Polymer
    - Steroid
    - . . .
  - Organic compound by form of the chain[x]
    - aliphatic compound
      - aliphatic hydrocarbon
    - cyclical compound

On the other hand we are aware that the alphabetic order imposed by a computerized selection gives rise to results which often render obscure the presentation itself.

In this case as well the programs set up and an appropriate structure enabled us to "short-circuit" these limitations and to draw up a more logical order.

- Radiation physics
  - black body
  - radiation beam
  - wave or radiation
    - electromagnetic radiation
    - mechanical wave
  - . . .

  - Frequency
  - Wave length

  - Doppler effect
  - Wave propagation
  - . . .

  - Radiation effect
  - Holography
  - . . .

  - Collimation /beam/
  - Deflexion /beam/

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[x] non-descriptor titles

The macrothesaurus which is currently undergoing verification in divers contexts of application: inventory of research in progress, description of information services, scientific and technical libraries, etc., should be available in 1976.

To recapitulate briefly, the macrothesaurus endeavors to effect an ordered presentation of the whole span of sciences and techniques while stressing the relations between the fields which make up the totality of these disciplines. In this respect it is totally dissimilar from the former and highly familiar classifications of these sciences. By employing the full gamut of present possibilities of data processing, it seeks to unite the rigor of a branching structure with the flexibility conferred by possibility of association: this instrument has been specifically invented with a combinative finality. Confronted with the occasional necessity of descending to a rather subtle level in order to allow for the essential structures of interdependence between the various fields, it has assembled, thanks to the modalities of administration employed, a number of terms which suffice to afford both a large indexing and the exchange of information between specialized sectors.

It would thus seem that such a linguistic implement, in view of its multidisciplinary character, should prove useful to every data bank which is destined to process several fields of knowledge simultaneously, and that this potential utility should prove particularly effective where research projects constitute most of the data bank.

DISCUSSION, Session III, Part 3.

Moderator: R. APPLEYARD,
Director General,
Scientific and Technical Information and
Information Management /D6 XIII/,
Commission of the European Communities,

Discussion of the paper by P. LÁZÁR

A. ROMDHANE: Je voudrais appuyer l'orateur sur un point. Je crois aussi qu'il n'est pas sage pour les pays en voie de développement de concevoir deux systèmes d'information distincts, un sur les recherches en cours et un autre sur les résultats de ces recherches. En effet, dans ces pays la recherche est encore embryonnaire sauf peut-être dans le domaine agricole où elle est parfois assez développée. Donc, un système d'information sur les recherches en cours ne peut y être, à mon avis, que complémentaire d'un système général sur l'information scientifique et technique.

P. LÁZÁR: I think it is not only a problem for the developing countries but also for all countries. If we look at the Guidelines of UNISIST[1], we have on pages 4 and 5 a very interesting description of how information on scientific and technological activity derived from the current research information system could assist the national science information systems, and there are four points enumerated. However, the real connecting link between two is lacking. Normally, if you have some ongoing research projects, they will be terminated by research reports, a normal document which you may handle and you should handle like a publication and this research report is the object of the so-called normal information system on science and technology. This research report means the description of the results of the research work and might provide the link between the two types of systems.

D. TORRIJOS: Mr. Chairman, I would like to be another supporter of Dr. LÁZÁR because he has raised many points in his discussion which, I feel, are relevant to the developing countries. I think that UNESCO, with its international character and broader objectives and goals, may be effective in evaluating, and possibly is in a position to implement the following recommendations as to the future role that UNISIST may play in terms of information systems for ongoing research, and I would like to suggest:

1/ sponsoring a number of pilot efforts designed to test the value of the transfer of ongoing research information from one country to another and to examine the various ways in which such a transfer might be effectively and economically undertaken in the developing countries;

2/ undertaking a programme of technical assistance including training on a national level which would assist in the development of ongoing research information systems and services specifically tailored to the needs of individual countries. There are quite a number of training programmes but they are usually of international character which do not really meet the needs of individual countries;

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[1] Guidelines on the Conduct of a National Inventory of Current Research and Development Project.

3/ establishing an ad hoc committee or working group within the UNISIST programme to assist in the follow-up of this symposium. Such a working group or committee could inter alia have the following functions which have been brought up by many participants during the discussion, a/ to examine selected areas of potential compatibilities, such as - and this is what has been stressed by Dr. LÁZÁR in his paper - standardization of basic data element requirements with a view towards removing existing barriers to development and co-operation; b/ to encourage bilateral and multilateral research and development on ongoing research information problems of general concern such as barriers to international exchange and processing improvements and to tape interexchange. Here I would even go a bit further, possibly to assist, whenever possible, some developing countries in strategic places, to develop their hardware facilities so that they are not limited to a one-way participation in programmes like this. When I say one-way, I mean preparing the inputs but never getting benefit of the outputs; c/ to assist in the development of a UNISIST programme in ongoing research information compatible with the objectives of UNISIST and the needs of both the developed and the developing countries.

These are points which have been raised in many meetings of the Association for Science Co-operation in Asia which for lack of funds was not able to take action and I feel that UNESCO is in a better position to help us out.

M. MENOU: Quand on parle de l'exhaustivité de la couverture des projets de recherche, en ce qui concerne les pays en voie de développement j'ai un peu peur qu'on oublie un aspect important qui est celui du recensement des organismes et des programmes chargés de collecter des données sur le pays, notamment en ce qui concerne la recherche socio-économique et le développement.

P. LÁZÁR: I think this is a very realistic problem but it is related to science policy, which we, as information scientists, have to follow.

D. HERSEY: I just want to make one comment in response to the statement by Dr. LÁZÁR, that he was surprised that we had not considered in the programme committee the discussion vis-à-vis the separation of ongoing research systems versus bibliographic systems - I think it is only fair to say that we did consider it, as many of the papers which were presented covered both systems and we assume that following the discussion of the presentation of those systems one would know the benefits and disadvantages so that people could decide for themselves.

Discussion of the paper by M. EL HADI

EL SAMMANI: Mr. Chairman, I fully support Dr. EL HADI in his statement about the need for self-reliance for any activities of this sort in Africa, but I think this is natural because the concept of self-reliance both as a philosophy and a practice is a truly African concept. We are speaking now about very sophisticated systems of information that we are hoping to develop in Africa and this is very much needed. At the same time, however, we have our own systems and the difficulty would be how to develop them rather than adopting new systems existing elsewhere. It would be very interesting for you to know that in Africa, somewhere, there are two systems for conveying information, for example the tam-tam conveying information between one village and another about the death of a chief and the computer, the sophisticated one. This is the sort of situation we find ourselves in. We have to hurry - Africa generally is in a hurry - we have to bridge the gap. On the other hand, I would love to see ourselves trying to be original and relying, as much as possible, on our imagination, using our own indigenous methods, preserving as much as possible, our cultural values and at the same time developing our systems to meet our urgent needs of accelerated development. In this, I am really sympathetic to my friend EL HADI and to CAFRAD because this is a new organization and we want it, as much as possible, to avoid the previous mistakes or this sort of attitude consisting of transferring horizontally ready systems, rather than trying to develop vertically within your country the ones needed. Recently we have been busy ourselves studying the effects of the Sudan-Sahelian drought in Africa, e.g., that was a problem which we have faced, which has been tackled from different angles and by different investigators including scholars. We, however, did not unfortunately receive any information about the drought from the African countries. We did not know, for example, the magnitude of the problem in Ougadougo, in Upper Volta, in Niger... My proposal to CAFRAD and my proposal to any regional institution would be that environmental information systems should be augmented within the region. I would love to see someone from Sweden call CAFRAD to ask about any literature about onchocerciasis. I would like this information to come from the African institutions as much as possible. We don't want to spread thin, we want to concentrate. Facilities are limited, so let us use these facilities as much as possible to suit our needs to be correlated to our environment and at the same time to contribute internationally, since we have to offer something that is emanating from our environment. I am sorry I have talked so much but I am really concerned about any new organization that might develop in Africa, that it should have an original pattern rather than a traditional imported one, that would neither work nor serve our purposes nor serve humanity in general.

R. APPLEYARD: Thank you very much. That is a deep concern that many people share and I am sure Dr. EL HADI does, and it is something we ought to come back to in discussion later if we can.

Discussion of the paper by Mrs. WOLFF-TERROINE

I. WESLEY-TANASKOVIČ: I would like to ask Mrs. WOLFF-TERROINE if this macrothesaurus which she described so clearly could be used in a multilingual information system since the one with which we are dealing here, the ongoing research one, must be a multilingual system.

Mme. WOLFF-TERROINE: Il me paraît évident qu'un tel type d'outil est destiné à rompre les barrières linguistiques, car il y a non seulement la barrière qui sépare les divers domaines mais le problème de la barrière qui sépare nos divers langages. Et je ne vous cacherai pas que ce macrothesaurus qui a été réalisé à l'incitation de la Délégation générale à la recherche scientifique et technique en France, initiative reprise par le Bureau national de l'information scientifique et technique, ce macrothésaurus a été vu dans l'idée d'une traduction en d'autres langues dans une deuxième étape.

G. TREVISAN: Mme WOLFF-TERROINE, est-ce que je me trompe si je dis qu'il y a une certaine analogie de conception entre le système Ariane et le macrothesaurus?

Mme. WOLFF-TERROINE: Je pense que vous ne vous trompez pas du tout, Monsieur. En effet, je dois dire quand j'ai vu "Ariane" au début, je l'ai vu sous un aspect informatique et je l'ai considéré comme quelque chose de très différent. Maintenant que j'ai vu "Ariane" travailler, je me rends compte que ce système et le macrothesaurus reposent sur la même idée de cheminement logique de la pensée.

A. ROMDHANE: Ce macrothesaurus, est-il un outil pour la description des projets de recherche, ou peut-il servir pour l'analyse et l'indexage des documents scientifiques et techniques en général?Seconde question: où est-ce que vous le situez par rapport au macrothesaurus de l'OCDE, y a-t-il affinité entre les deux ou quelque chose comme ça?

Mme. WOLFF-TERROINE: Pour les recherches en cours, nous sommes en train de tester ce macrothesaurus sur un inventaire que nous venons de réaliser en France sur les recherches en sciences de l'information et nous voudrions

l'essayer dans le domaine medical. Nous sommes aussi en train de le tester dans une grande bibliothèque technique afin de voir sa valeur pour la description d'articles de la littérature. Donc, vous voyez des contextes d'utilisation assez différents, toujours avec l'idée de multidisciplinarité. Quant à nos liaisons avec l'OCDE, jusqu'à maintenant, elles ont été amicales mais s'arrêtent là. Je dois dire que les domaines couverts sont différents, mais je pense que pour que le macrothesaurus soit vraiment efficace, nous devrions envisager une complémentarité et un accord avec les domaines couverts par le macrothesaurus de l'OCDE.

E. DE GROLIER: Je me demande si le macrothésaurus et le Broad System of Ordering sont compatibles ou non, et je me demande aussi s'il ne serait pas utile de faire une étude de concordance du type de ce qu'avait fait M.NEVILLE [2] en Grande-Bretagne. Je pense qu'une telle étude serait utile pour examiner s'il est vraiment possible d'assurer une compatabilité entre les systèmes. J'ai remarqué hier que M. MICHEL nous a dit en parlant d'"Ariane" que ce système n'était sûrement pas compatible avec un autre système et qu'il ne pensait pas qu'on puisse assurer une compatibilité entre les différents systèmes nationaux et internationaux au plan de l'organisation des concepts. Alors j'aimerais avoir vos commentaires sur ces deux points. Le troisième point, en ce qui concerne les sciences sociales, que je représente ici, il y a encore moins de compatibilité à l'heure actuelle entre les systèmes. Madame HOGEWEG-de-HAART nous a dit qu'elle n'avait pas trouvé très facile l'application du thésaurus de M. VIET dans son propre domaine. Au Conseil International des Sciences Sociales, nous avons un Comité permanent /"Standing Committee"/ sur les données en sciences sociales présidé par Monsieur SCHEUCH de Cologne, où ces problèmes de compatibilité entre les langages et les systèmes de classification utilisés notamment pour la classification des données quantitatives, est examiné et jusqu'à présent il ne semble pas qu'il y ait beaucoup de compatibilité. En ce qui concerne la compatibilité entre sciences sociales et sciences tout court, je me demande s'il ne faut pas tout de même la recherche, étant donné que vous avez cité deux disciplines des sciences sociales qui interfèrent avec les sciences naturelles, mais je crois qu'il y en a beaucoup d'autres: l'anthropologie, la psychologie, etc. Ainsi par exemple le problème d'assurer une compatibilité entre les sciences biologiques et les sciences sociales se pose d'une manière très aiguë dans le domaine de l'environnement. Voilà trois questions, Madame, je ne pense pas que vous puissez y répondre dans le temps qui nous est imparti, mais je pense qu'elles seront importantes à suivre par le "follow-up" de cette conférence.

Mme. WOLFF-TERROINE: Je répondrai très rapidement. Pour les sciences sociales, vous avez tout à fait raison et il faut poursuivre la recherche de compatibilité. Je n'ai cité que deux exemples, c'étaient des exemples, d'autres existent. Pour le Broad System of Ordering, j'ai ici sous les yeux les critiques ou les suggestions que j'ai faites en réponse à l'UNESCO et à la FID qui me demandaient des commentaires. Je crois qu'il est difficile de comparer les deux choses vu que le Broad System of Ordering est un système classificatoire rigide qui n'admet que trois niveaux de profondeur et je ne veux pas détailler ici les critiques ou les suggestions que j'ai faites. Par contre, en ce qui concerne les problèmes de compatibilité, et vous citez l'étude de M. NEVILLE qui reste toujours le monument auquel on se réfère, je crois qu'il faut que nous arrivions pour les langages, et là le macrothésaurus peut être un outil, à faire des convertibilités par voie algorithmique. A l'heure actuelle nous savons utiliser toutes les bases de données quel'que soit leur format parce que nous avons tous les programmes de reformatage au point. Il faut que nous arrivions à la même technique par des études de compatibilité sur le plan des langages. Je crois que je ne peux pas en dire plus maintenant.

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[2] NEVILLE, H.H.: Feasibility Study of a Scheme for Reconciling Thesauri Covering a Common Subject, Journal of Documentation, 26 no.4.p.313-336 /1970/.

H. HOGEWERT-DE-HAART: One of the difficulties we met in the compatibility was also that things of interest in my country were considered differently in the thesaurus we translated. It seems that this thesaurus was developed more for theoretical research than for applied research in which we are involved in the Netherlands. For instance a great topic in our country is social welfare and we could not find very much on social welfare in this thesaurus. Compatibility seems to be difficult between different countries because, in social sciences, there is a difference of interest.

D. HERSEY: There are two things. I think most of the attendees would agree with me that the topic of vocabulary and compatibility are important, and that is one of the reasons we introduced, in one or two places, an opportunity for this kind of discussion, but I think you would also have to agree with me that we could devote an entire symposium just to the topic of vocabulary development and compatibility, and certainly it should be a general concern of UNISIST and whatever follow-up comes out of our discussions here during this symposium, but we are running out of time and I suggest we go on.

M.EL HADI: I am sorry to come again to the problem of thesaurus and its compatibility. In CAFRAD we needed a thesaurus for administrative information, and when we tried actually to start this kind of a thesaurus, we examined most of the existing ones and unfortunately we could not find descriptors which can index African material. That is why we started to design and to construct our own thesaurus ourselves. Of course, we took all that has been said of designing and the structure of thesaurus into consideration. This thesaurus was completed two years ago and we are now working on the French and the Arabic versions.

SESSION IV

INTERNATIONAL EXCHANGE:
ITS VALUE AND MECHANISME FOR ACCOMPLISHMENT

L'ECHANGE INTERNATIONAL:
SA VALEUR ET LES MECANISMES DE SA REALISATION

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Session IV

Part 1

Paper 34

Summary

THE CURRENT CANCER RESEARCH PROJECT ANALYSIS CENTER /CCRESPAC/
OF THE INTERNATIONAL CANCER RESEARCH DATA BANK /ICRDB/ PROGRAM

This paper summarizes the background of the International Cancer Research Data Bank /ICRDB/ Program and outlines the major operational components which deal with research in progress. These are: the Current Cancer Research Project Analysis Center /CCRESPAC/; four Cancer Information Dissemination and Analysis Centers /CIDAC's/; and an on-line system for cancer information dissemination called CANCERLINE. The paper then summarizes international aspects of the ICRDB Program, including the role of the International Union Against Cancer and of its Committee on International Collaborative Activities /CICA/; the role of other international organizations, such as the International Agency for Research on Cancer and the Pan American Health Organization; and the role of an operating network of coordinators within countries. In addition, the paper summarizes activities of the ICRDB Program in the United States.

The operation of the Current Cancer Research Project Analysis Center /CCRESPAC/ is emphasized, including data collection, input analysis procedures, development of effective approaches to indexing and retrieval of new concepts, and support of on-line access to information. Output services and benefits that will be made available to those who participate in the program are summarized. Finally, a time schedule for the first year of operation is presented.

Résumé

LE CENTRE D'ANALYSE DES PROJETS DE RECHERCHE EN COURS SUR LE CANCER /CCRESPAC/
DU PROGRAMME INTERNATIONAL POUR UNE BANQUE DE DONNEES SUR LA RECHERCHE
SUR LE CANCER /ICRDB/

Les auteurs retracent brièvement l'historique du Programme international pour une Banque de données sur la recherche sur le cancer /ICRDB/ et présentent les principaux eléments opérationnels qui traitent des recherches en cours. Ce sont: le Centre d'analyse des projets de recherche en çours sur le cancer /CCRESPAC/; quatre Centres d'analyse et de diffusion d'informations sur le cancer /CIDAC/ et un système d'interrogation directe pour la diffusion d'informations sur le cancer, appelé CANCERLINE. Les auteurs résument ensuite les aspects internationaux du Programme ICRDB, montrant en particulier le rôle de l'Union internationale contre le cancer et son Comité sur les activités inter-

nationales comme le Centre international de recherche sur le Cancer et l'Organisation panaméricaine de la Santé et celui du réseau de coordinateurs opérationnels à l'intérieur des pays. Le document contient, en outre, un aperçu des activités du Programme ICRDB aux Etats Unis.

Les auteurs mettent l'accent sur le fonctionnement du Centre d'analyse des projets de recherche en cours sur le cancer /CCRESPAC/ et étudient en particulier le rassemblement des données, les procédures d'analyse des données à l'entrée, la mise au point de procédés efficaces pour l'indexation et la recherche des concepts nouveaux, et la promotion de l'accès direct à l'information. Ils résument les services offerts et les avantages dont bénéficieront les participants au système et, enfin, donnent le calendrier des travaux prévus pour la première année de fonctionnement.

THE CURRENT CANCER RESEARCH PROJECT ANALYSIS CENTER /CCRESPAC/ OF THE INTERNATIONAL CANCER RESEARCH DATA BANK /ICRDB/ PROGRAM

W.R. FOSTER - J.H. SCHNEIDER

Background

The International Cancer Research Data Bank /ICRDB/ Program is a cooperative effort of many nations, funded at the present time by the National Cancer Institute in the United States. The Program was established by the National Cancer Act of 1971. The ongoing research component of the Program is called the Current Cancer Research Project Analysis Center /CCRESPAC/.

The purpose of the ICRDB Program is to provide an international cancer information service. It is a cooperative effort which has proceeded with the active participation of several international organizations, including the International Union Against Cancer /UICC/ in Geneva, Switzerland, and its Committee on International Collaborative Activities /CICA/, the International Agency for Research on Cancer /IARC/ in Lyon, France, the Pan American Health Organization /PAHO/, and other components of the World Health Organization /WHO/.

All these organizations, and many others around the world, are participating in the collection of ongoing research projects. Altogether, there have been discussions with 147 representatives from 50 countries other than the United States, of whom 54 have made specific arrangements for input. A total of 700 projects has been received at CCRESPAC from 16 of these countries to date. Many additional project descriptions from these and other countries are currently being collected.

In addition to the collection of information in all fields of cancer, the ICRDB Program is supporting two clearinghouses in specific subject areas:

1/ A Registry of Controlled Therapeutic Trials which is funded jointly by the International Union Against Cancer /UICC/ and the ICRDB Program. This project has been supported by the UICC since 1967, and is operated by Dr. FLAMANT at the Institute Gustav Roussy in Paris. Outlines of the protocols currently being evaluated for the treatment of cancer are periodically published and disseminated; and

2/ A Clearinghouse for Cancer Epidemiology Research. This project is funded jointly by the International Agency for Research on Cancer /IARC/ in Lyon, by the German Cancer Research Center in Heidelberg, and by the ICRDB Program. It is operated by Dr. C. MUIR at Lyon and Dr. G. WAGNER, Heidelberg, as project directors. This effort covers the collection of all aspects of cancer epidemiology and will result in the publication of an annual directory that will be sent to all cancer epidemiologists.

Collection of descriptions of ongoing cancer research projects has been particularly active in the United States. To date, approximately 8015 cancer project descriptions have been received from U.S. sources. The comprehensive cancer research centers in the U.S. have been a major source of input of these descriptions.

The projects underway cover a wide variety of cancer information dissemination and analysis activities, including the international collection and dissemination of information about current cancer research projects and abstracts of published literature. Much of this information is disseminated through computerized on-line retrieval of stored data through a multi-data base system called CANCERLINE, and through a program for Selective Dissemination of Information /SDI/. Another project to be supported involves direct scientist-to-scientist communication.

One of the major features of the Program is Cancer Information Dissemination and Analysis Centers, or CIDACs. Each one of these centers will cover a major area of cancer research, and will bring together all information activities relating to that subject area. The centers are in the process of being established at the present time.

Input data to the ICRDB Program comes from cancer research organizations around the world, from research results presented at scientific meetings or published in cancer publications, and from special ICRDB-supported centers outside the United States.

The Current Cancer Research Project Analysis Center /CCRESPAC/plays an important role in many aspects of the ICRDB Program. This CCRESPAC Program began operation in January 1975. It is operated for the ICRDB Program by the Smithsonian Science Information Exchange /SSIE/. Because of the nature of this Symposium, it is desirable to concentrate specifically on the operation of CCRESPAC and on the techniques used and problem areas encountered in that operation.

Nature of Specific CCRESPAC Operations:

1. Data Collection

The collection of information in each country outside the U.S. is, when possible, the responsibility of a "research information coordinator" who is knowledgeable about cancer research activities in his country. This coordinator contacts the directors of institutions where cancer research is in progress and supplies them with forms for collecting research project descriptions.

In some countries this procedure is modified or supplemented by gathering data on projects from major agencies that fund cancer research. As an example, in the United States, arrangements exist for routine input of project descriptions from all major Federal and most major non-Federal agencies /including foundations and voluntary health agencies/ that support cancer research. At the same time, mailings and telephone contacts are made with individual cancer research organizations as already discussed.

2. Input Analysis

Analysis is done by a scientific staff with strong biomedical backgrounds in the subject areas covered. This preserves the professional integrity of research concepts and insures that these are interpreted in a way that corresponds with the viewpoint of each research worker who provided a project description. When a request for data is received, the same scientific staff who indexed the project descriptions in a given subject area also search that same area and screen the output to make sure that each project description is relevant to the request.

At present, 54 SSIE staff scientists provide this type of support. 46 are at the doctorate level or have other advanced graduate degrees. These staff members work closely together, and contribute their understanding of their fields to an interdisciplinary approach.

3. Development and use of a special cancer classification

One of the major components of the CCRESPAC Program is the design of a special hierarchical classification of cancer categories covering the full range of cancer research. Initial work on a series of approximately 800 categories produced under the direction of Dr. SCHNEIDER, the director of the ICRDB Program, has been completed. This classification will be useful not only for the analysis of research in progress, but also for the analysis and indexing of published cancer research literature. In addition, the classification will provide an excellent tool for on-line searching and retrieval of information from the CANCERLINE System. This new cancer classification supplements the more general and comprehensive hierarchical index already used at SSIE to index project descriptions.

Output Products and Services:

Because the major emphasis of the ICRDB Program is on rapid dissemination of its products and services, it is essential to briefly discuss some of these products.

CANCERLINE is the name of a series of computer-based data files developed by the ICRDB Program and maintained in the data base of the computer center located at the U.S. National Library of Medicine. The main CANCERLINE file contains abstracts of the published literature.

Another data file is called "Cancerproj" and contains over 6000 ongoing research project summaries. These are the cancer-related summaries obtained from the master SSIE file of over 125 000 projects collected each year in all research areas. The "Cancerproj" file is a new file and is still in the testing phase. Eventually, this file will contain approximately 10 to 12 000 summaries of ongoing research related to cancer.

A third file, also still under development, is called "Clinprot" and will contain summaries of clinical cancer treatment protocols.

All of the CANCERLINE data files, after they have been tested and are no longer experimental, will be available to all Medline users throughout the world. Medline is the name of the overall computer data retrieval system located at the National Library of Medicine. There are over 450 computer terminals in the U.S. and other countries that provide users access to Medline and to the CANCERLINE files.

In addition to CANCERLINE, a series of publications, or technical bulletins, containing descriptions of research projects in narrow areas of cancer research are now in various stages of production. The first of these bulletins contains descriptions of 118 research projects dealing with the isolation and synthesis of anticancer agents. Each individual who contributes a project summary to the new data base will receive a copy of the technical bulletin/s/ in which his project is listed. This will help him identify and establish direct communications with research personnel in other countries and in his own country who are working in the same narrow research area. We estimate that there will be between 60 and 100 technical bulletins on different cancer research areas produced each year by CCRESPAC. These are produced from computer printouts.

CCRESPAC has produced a directory consisting of 6 volumes which contain the descriptions of nearly 6600 current cancer research projects that had been received by May 1975. Each of the volumes deals with a different cancer research area:

- Pre-clinical aspects of cancer therapy;
- Clinical aspects of cancer therapy;
- Viral carcinogenesis;
- Other aspects of carcinogenesis and cancer epidemiology;
- Cancer immunology; and
- Cancer biochemistry and other cancer-related biology.

The data base established by CCRESPAC is used to retrieve and send one-page project descriptions in a specific subject area to any cancer scientist who requests such information. Thus, even if a scientist does not have access to the CANCERLINE System and even if he does not receive the Special Listings mentioned previously, he can still request and receive project descriptions which meet his specific need for information.

Another important use of the CCRESPAC data base is to identify "affinity groups" of scientists who are working in the same narrow subject area, and provide Selective Dissemination of Information /SDI/ to groups of individuals.

Summary and Schedule of Activities:

The CCRESPAC Program began in January 1975. To date, work has included:

- Publication of 6 directories covering the major segments of cancer research;
- Production of the CANCERPROJ on-line data base containing 6600 cancer research project descriptions;
- Production of preliminary versions of Special Listings of cancer research projects in narrow subject areas, and formulation of plans for about 100 more of these;
- Production of an experimental on-line CLINPROT data base containing outlines of clinical cancer protocols;
- Providing listings of cancer project descriptions in response to requests for information; and
- Development of a new hierarchical classification for cancer research projects.

These activities will play a very important role in keeping cancer researchers around the world aware of what other researchers are studying. The resulting increase in personal interaction and communication between scientists, increase in the possibility of collaborative efforts, and decrease in duplication of effort should significantly improve the efficiency, productivity, and progress of cancer research.

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Session IV

Part 1

Paper 35

Summary

THE ELABORATION OF INDEXES OF CURRENT TROPICAL ECOLOGICAL RESEARCH

Because of the multiplication of ecological research projects in several countries, communication among scientists becomes more difficult every day. The main reason is that the time elapsed between the beginning of a program and the appearance of its first publication may take several years.

One consequence of this problem is an increasing number of repetitive projects and a lack of communication among scientists working on the same subject in different parts of the world. This is even worse in developing countries, where horizontal communication is difficult and vertical communication is usually very inefficient.

For this reason, the National Council for Science and Technology, by means of its National Program of Tropical Ecology, has given its support to the elaboration and publication of the first Index of current Tropical Ecological Research.

The results obtained to date, as well as the methods used for their elaboration, will be exposed in this work. We will also consider a project to continue and broaden the Index's content.

Résumé

L'ELABORATION D'INDEX DES RECHERCHES D'ECOLOGIE TROPICALE EN COURS

La multiplication des projets de recherche écologique dans plusieurs pays rend la communication entre soientifiques de jour en jour plus difficile, surtout parce qu'il s'écoule un long délai, de plusieurs années parfois entre la mise en route d'un programme et la parution de la première publication le concernant.

Par suite de cet état de choses, il y a un nombre croissant de projets qui font double emploi et les chercheurs qui travaillent sur le même sujet dans différentes parties du monde n'ont pas de contacts entre eux. La situation est même pire dans les pays en voie de développement où la communication horizontale est difficile et où la communication verticale est habituellement dénuée de toute efficacité.

C'est pourpuoi le Conseil national pour la Science et la Technologie a soutenu, dans le cadre de son Programme national d'écologie tropicale, l'élaboration et la publication d'un premier Index des recherches en cours dans le domaine de l'écologie tropicale.

Les auteurs de l'exposé montrent les résultats obtenus à ce jour, de même que les méthodes utilisées pour leur élaboration. Ils examinent aussi un projet visant à poursuivre l'établissement de l'Index en élargissant son contenu.

THE ELABORATION OF INDEXES OF CURRENT TROPICAL ECOLOGICAL RESEARCH

E. PARDO TEJEDA - A. GOMEZ POMPA

Because of the large number of ecological research projects in several countries, communication among scientists becomes increasingly difficult each day. The main reason is the time lapse between the beginning of a programme and the appearence of its first publication, which may take several years.

One consequence of this problem is the increasing number of repetitive projects due to lack of communication between scientists working on the same subject. This situation is even worse in the developing countries where horizontal communication is difficult and vertical communication very inefficient. Added to this we must consider the problem of identifying programmes derived from their own necessities and interests.

In the developing countries very little money is assigned for scientific research, as in Maxico for instance. Here less than 0,5% of the total gross national income is designated for research, and thus it would be a very considerable waste to duplicate research projects. Our work is especially designed for these countries, but we sincerely hope that it will also stir an interest in the more developed countries.

Considering all these reasons it is our aim to eliminate the information deficiency by means of establishing, in a relatively short space of time, a "Projects Index" of research programmes in the world's tropical zones. We know that there are available well-reputed compiled abstracts of published ecological research, but they lack the information timeliness mentioned before, and they are generally very expensive and therefore beyond the budget of certain organizations.

This first index is related to tropical ecology and next we will discuss the methods employed for its elaboration and the results obtained to date.

A questionnaire in Spanish, English and French was distributed among the institutes and universities appearing in the World's Ecological Society's directory. Other multiple research institutes suggested that they be contacted. In this questionnaire we asked for the following data on each project conducted; Projects's title and objectives; initiation and probable completion date; researcher's name; institute's name; country and region where work took place; name of locally participating personnel and institute and citation of their most recent contribution on the subject. We also ask for copies of publications of these works.

In 6 months we received answers for 505 research projects in 54 countries, being sponsored by 48. The data of each of the works were integrated with respect to each language. The index thus integrated is divided into 4 sections:

a/ The first section is called "Project Catalogue"; in it we list all the works according to the questionnaire data.

b/ The second section is called "Geographical Index of Authors"; it gives a list of all the researchers in charge in alphabetical order according to the promoting country.

c/ The third section gives the author index and collaborators.

d/ The fourth section is the key words index, in Spanish and English. We consider that offering a key to the works, the index would be more useful and individual projects would be more easily located by any user. The alternative grouping them into general subjects was unsatisfactory. The key words were chosen by a group of specialists after studying the objectives and contents of each project.

The information received was manually processed as it came.

We expect to publish this index twice every year providing sufficient relevant material is available. It will be updated and/or revised every 2 years. The next publication we hope, will be totally elaborated by computer. That will allow us to shorten the data processing time and eliminate arduous manual labour.

We would be considered naive in thinking that the data compiled in this index is absolutely representative of the world's publications on tropical ecology research; we are conscious of the fact that it is not, especially in this prototype. However, we believe that an analysis could give us a more or less general situation of what is actually being studied worldwide in this field./Evidently the data obtained from projects ongoing in Mexico are more representative than those from other countries/.

We cannot predict exactly at this moment how representative our data is, but we hope to reduce doubt as experience accumulates with the oncoming publications of the Index.

By practising an analysis of the information obtained to date, we reached the following results:

I. From the 3000 questionnaires sent, we received 505 answers in 6 months, which is 16,83% of the total.

II. 80% of researchers in charge sent copies of their most recent contributions.

III. Projects were sent from 48 promoting countries, of which 15 were American, 7 European, 12 Asian and 14 from Africa, Australia and New Zealand, /tables I and II/.

From the total 505 research studies, 63,8% are sponsored by American countries. /It is convenient to note here that 33,8% of these are Latin American countries and that 59,6% only are sponsored by the U.S.A./.

The rest were distributed according to the following sequence:

10,3%	European countries
15,3%	Asian countries
10,6%	Africa, Australia and New Zealand.

We have made en admittedly arbitrary distribution of countries according to their degree of development. In this way it is interesting to note that 45,35% of projects in tropical ecology are being promoted by 36 developing countries and the other 54,65% by 12 countries being considered as industrialized : USA; Canada; European countries; Japan; and Australia and New Zealand /table III/. Unfortunately, we did not have the information necessary, to send questionnaires to east European countries and the USSR; however, we have sent samples of the Index to libraries of the principal capitals of these countries and we hope to count on their collaboration in the future.

IV. The projects have been classified in 14 general research areas /table IV/ and from this classification we observe that the 5 most studied areas are the following:

a/ Floristic investigation	30,3%
b/ Faunistic investigation	18,2%
c/ Hydrobiological studies	16,4%
d/ Population dynamics/bioenergetics	9,7%
e/ Socio/human ecology	6,4%
	81,0%

We have already sent a specimen copy of the index to each of the directors of the projects appearing in it. We are pleased to say that we have received from them letters of congratulations and approval of the index, they also give their moral support and suggestions for the improvement and continuation of the index, for instance, regarding the key words for the volumes, and possible periodicals the works will appear in.

We decided to modify the questionnaire, adding a clause asking the authors to name their key words under which their works will be classified and periodicals in which they would appear.

We are now in an experimental and initiation stage, open to all kinds of suggestions to improve promotion, presentation and depth of this index. We desire the help of all those interested organizations, to attain the objective improving the channels of scientific communication.

Goals for future:

We need to produce a brochure announcing the Index to libraries, researchers, governments, etc. We need to distribute our questionnaire as widely as possible.

We need to publish the second number of the Index.

We want to computerize all bibliographic information contained in the Index.

We hope to build from this first step an information system on tropical ecology available to all scientists and interested people.

Up until now we have given priority to tropical zones, but in due course we are planning to cover arid zones. We do not plan to work in temperate zones, for information regarding these is already plentiful.

It would be helpful to have the moral and economic support of UNISIST in our future projects.

TABLE I

CLASSIFICATION OF PROJECTS BY PROMOTING COUNTRIES.

Country	Project	Country	Project
1.-Argentina	3	25.-Japan	2
2.-Australia	16	26.-Kenya	8
3.-Brazil	18	27.-Malaysia	7
4.-Canada	13	28.-Mexico	38
5.-Ceylon	1	29.-Mozambique	2
6.-Colombia	12	30.-Natal	7
7.-Korea	1	31.-Nigeria	4
8.-Costa Rica	5	32.-New Guinea	2
9.-Ecuador	3	33.-New Zealand	1
10.-Egypt	1	34.-Peru	5
11.-El Salvador	1	35.-United Kingdom	16
12.-Spain	2	36.-Fed.Rep.Germany	9
13.-United States	192	37.-Rhodesia	1
14.-Ethiopia	1	38.-Sweden	4
15.-Philippines	2	39.-South Africa	2
16.-France	10	40.-Surinam	3
17.-Ghana	4	41.-Thailand	4
18.-Guatemala	5	42.-Taiwan	1
19.-Neatherlands	8	43.-Tanzania	3
20.-Hong Kong	1	44.-Trinidad	3
21.-India	48	45.-Uganda	1
22.-Indonesia	7	46.-Venezuela	19
23.-Italy	3	47.-Vietnam	1
24.-Jamaica	2	48.-Zaire	3
		Total:	505

TABLE II
DISTRIBUTION OF PROJECTS BY CONTINENTS

AMERICA		EUROPE		ASIA		AFRICA, AUSTRALIA AND NEW ZEALAND	
Country	Project	Country	Project	Country	Project	Country	Project
1.-U.S.A.	192	1.-United Kingdom	16	1.-India	48	1.-Australia	16
2.-Mexico	38	2.-France	10	2.-Indonesia	7	2.-Kenya	8
3.-Venezuela	19	3.-Fed.Rep. of Germany	9	3.-Malaysia	7	3.-Natal	7
4.-Brazil	18	4.-Netherlands	8	4.-Thailand	4	4.-Ghana	4
5.-Canada	13	5.-Sweden	4	5.-Japan	2	5.-Nigeria	4
6.-Colombia	12	6.-Italy	3	6.-Ceylon	1	6.-Tanzania	3
7.-Costa Rica	5	7.-Spain	2	7.-Korea	1	7.-Zaire	3
8.-Guatemala	5	Total:	52	8.-Hong Kong	1	8.-South Africa	2
9.-Peru	5			9.-Taiwan	1	9.-Mozambique	2
10.-Ecuador	3			10.-Vietnam	1	10.-Egypt	1
11.-Argentina	3			11.-Philippines	2	11.-Ethiopia	1
12.-Trinidad	3			12.-New Guinea	2	12.-New Zealand	1
13.-Surinam	3			Total:	77	13.-Rhodesia	1
14.-Jamaica	2					14.-Uganda	1
15.-El Salvador	1					Total:	54
Total:	322						

TABLE III

DISTRIBUTION OF PROJECTS ACCORDING TO THE DEGREE OF DEVELOPEMENT OF THE COUNTRIES

DEVELOPED COUNTRIES		DEVELOPING COUNTRIES			
Country	Project	Country	Project	Country	Project
1.-U.S.A.	192	1.-India	48	20.-Zaire	3
2.-United Kingdom	16	2.-Mexico	38	21.-New Guinea	2
3.-Australia	16	3.-Venezuela	19	22.-South Africa	2
4.-Canada	13	4.-Brazil	18	23.-Jamaica	2
5.-France	10	5.-Colombia	12	24.-Surinam	3
6.-Fed.Rep. of Germany	9	6.-Kenya	8	25.-Mozambique	2
7.-Netherlands	8	7.-Indonesia	7	26.-Philippines	2
8.-Sweden	4	8.-Malaysia	7	27.-El Salvador	1
9.-Italy	3	9.-Natal	7	28.-Ceylon	1
10.-Japan	2	10.-Costa Rica	5	29.-Korea	1
11.-Spain	2	11.-Guatemala	5	30.-Hong Kong	1
12.-New Zealand	1	12.-Peru	5	31.-Taiwan	1
Total:	276	13.-Ghana	4	32.-Vietnam	1
		14.-Nigeria	4	33.-Egypt	1
		15.-Thailand	4	34.-Ethiopia	1
		16.-Ecuador	3	35.-Rhodesia	1
		17.-Trinidad	3	36.-Uganda	1
		18.-Argentina	3	Total:	229
		19.-Tanzania	3		

TABLE IV

CLASSIFICATION OF PROJECTS BY GENERAL FIELDS

FIELD	No. of PROJECTS
1.- Floristic investigation	153
2.- Faunistic investigation	92
3.- Hydrobiology	81
4.- Population dynamics/Bioenergetics	48
5.- Socioecology/Human ecology	32
6.- Nutrient cycles	29
7.- Biological control/Ecophysiology	16
8.- Parasitology	12
9.- Agricultural.Development	11
10.- Land use	10
11.- Forest regeneration	7
12.- Plant pathology	7
13.- Silviculture	4
14.- Microbiology	1
Total :	505

FIG. I.
DISTRIBUTION OF PROJECTS BY CONTINENTS

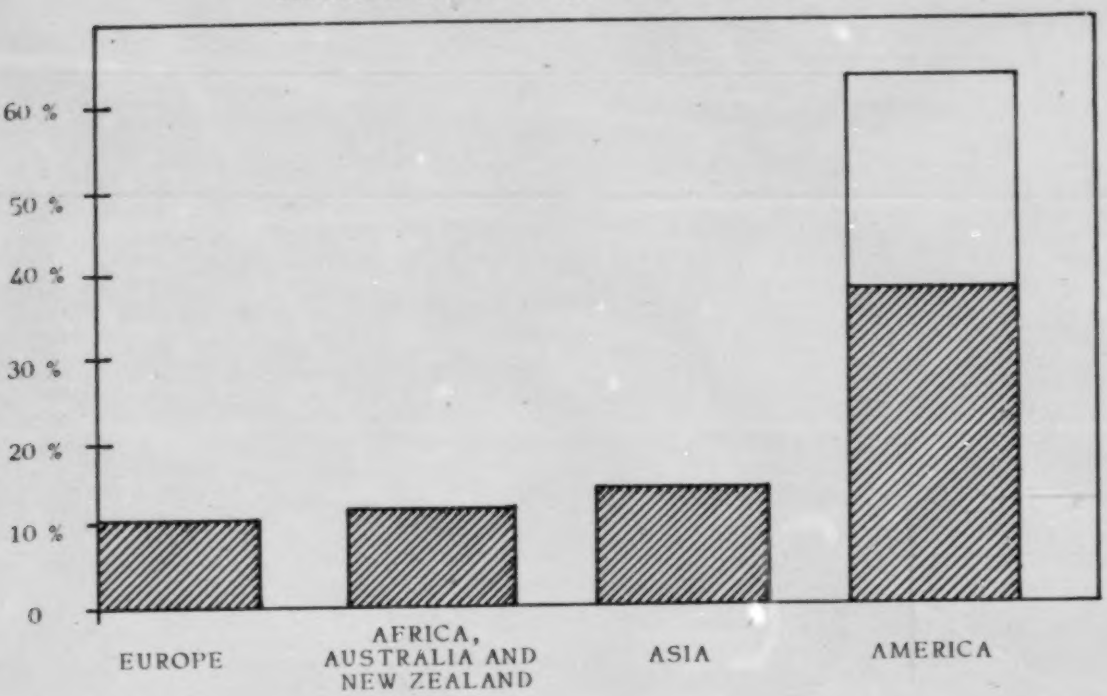
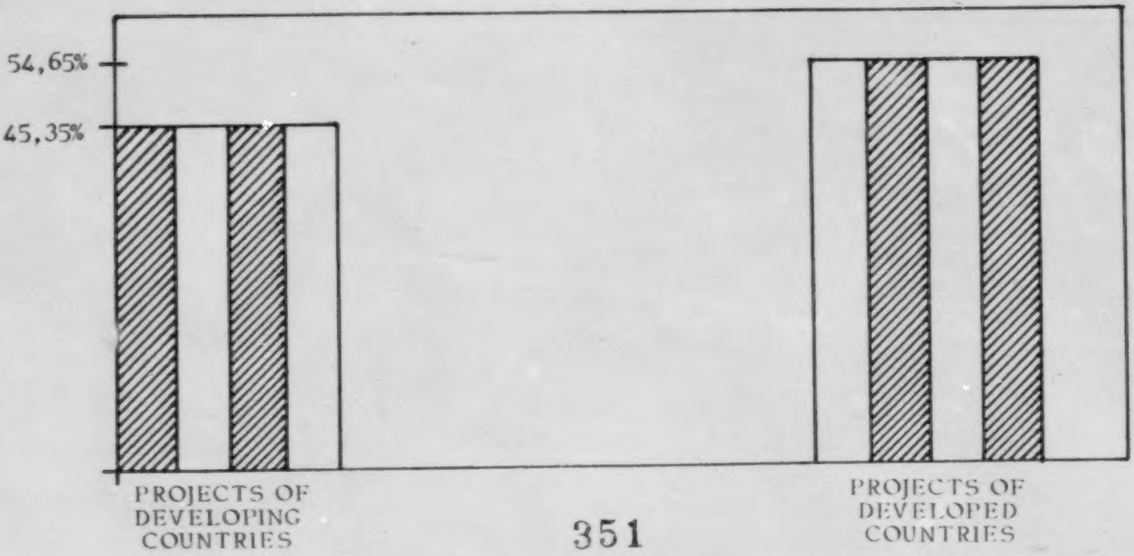


FIG. II.
DISTRIBUTION OF PROJECTS ACCORDING TO THE DEVELOPMENT OF COUNTRIES



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Library and Documentation Systems
Division,
Food and Agriculture Organization
of the United Nations /FAO/

Session IV

Part 1

Paper 36

Summary

A WORLDWIDE INFORMATION SYSTEM ON THE CURRENT AGRICULTURAL RESEARCH FOR THE DEVELOPING COUNTRIES - CARIS

The CARIS /Current Agricultural Research Information System/ project aims at establishing an international information system to collect, organize and disseminate basic data on agricultural research institutions, programmes and activities carried out in or on behalf of developing countries.

A pilot project sponsored by FAO and financed by several members of the Consultative Group on International Agricultural Research /CGIAR/ was initiated in March 1972 and terminated in the beginning of 1974.

After the results of this pilot project were evaluated in terms of methodological approach and of users' requirements, several members of the CGIAR agreed to support a 2-year starting phase for CARIS on a worldwide scale /developing countries/, limited to information concerning research institutions, workers, and main lines of research /or programmes/, and limited to the publication of directories.

It is foreseen that the CARIS project will be pursued beyond that phase. Information would be extended to the research project level, and dissemination would be improved by the creation of a "Question and Answer Service" and a "Service for Selective Dissemination of Information" in order to provide topical information, on request or for subscribers, including full project descriptions and bibliography on these projects from a computer memory data bank.

It is not anticipated in the future to centralize all operations in FAO, Rome, but to establish a CARIS Coordinating Centre in charge of the maintenance of methodology and liaison between several "Local" CARIS Centres /national or regional/ located in the developing countries. These local CARIS Centres would ensure the collection, indexing and processing of data, and dissemination of information, through services to users in their respective areas. The CARIS Coordinating Centre would also be in charge of information on a worldwide scale by merging information from the local CARIS Centres, thereby constituting a data base for the preparation of printed directories and tape copies of the data base to be sent to the local Centres.

Résumé

UN SYSTEME MONDIAL D'INFORMATION SUR LA RECHERCHE AGRICOLE POUR LES PAYS EN VOIE DE DEVELOPPEMENT - CARIS

Le projet CARIS /Système automatique d'information sur la recherche agricole/ vise à créer un système international d'information permettant de réunir, d'organiser et de diffuser des données de base sur les établissements de recherche agricole et sur les programmes et activités de recherche réalisés dans les pays en voie de développement ou pour le compte de ces pays.

Un projet pilote patronné par la FAO et financé par plusieurs membres du Consultative Group on International Agricultural Research /CGIAR/ a été entrepris en mars 1972; il s'est achevé au début de l'année 1974.

Après une évaluation des résultats de ce projet pilote en fonction de l'approche méthodologique adaptée et des besoins des usagers, plusieurs membres de CGIAR ont accepté de financer le CARIS pour une période initiale de 2 ans; l'entreprise, menée à l'échelle internationale /pays en voie de développement/, portera uniquement sur l'information relative aux établissements de recherche, aux chercheurs et aux principaux axes /ou programmes/ de recherche et on se limitera à la publication d'annuaires.

D'après les prévisions le projet CARIS sera poursuivi au delà de cette phase. Sa portée sera étendue de manière à englober les projets de recherche et la diffusion des renseignements sera améliorée par la création d'un "Service de questions et réponses" et d'un "Service de diffusion sélective de l'information" qui fourniront à la demande ou par abonnement des informations sur des sujets précis, y compris des descriptions complètes de projets et la bibliographie correspondante en se fondant sur une banque de données mises sur ordinateur.

L'idée n'est pas de centraliser à l'avenir toutes les activités à la FAO /Rome/, mais de créer un Centre de coordination pour le CARIS chargé de s'occuper de la méthodologie et d'assurer la liaison entre plusieurs centres "locaux" /nationaux ou régionaux/ situés dans des pays en voie de développement. Ces centres CARIS locaux veilleraient au rassemblement, à l'indexation et au traitement des données ainsi qu'à la diffusion de l'information par la fourniture de services aux utilisateurs dans leurs secteurs respectifs. Le Centre de Coordination pour le CARIS devrait également diffuser les informations à l'échelle mondiale en regroupant les renseignements des centres locaux pour constituer une base de données permettant d'établir des annuaires imprimés et des copies sur bande de l'ensemble des données rassemblées qui seraient envoyés aux centres locaux.

A WORLDWIDE INFORMATION SYSTEM ON THE CURRENT AGRICULTURAL RESEARCH FOR THE DEVELOPING COUNTRIES: CARIS

N.St. DUMITRESCU - A. THEVENIN

1. Objectives of CARIS

The CARIS project aims at establishing an international information system which would collect, organize and disseminate basic data on agricultural research institutions, programmes and activities carried out in or on behalf of the developing countries in order:

a/ to improve communications between institutions and between scientists;

b/ to assist in the evaluation of the adequacy of existing research efforts, and the identification of major gaps and weaknesses, as an aid to decision-making at both the national and international level.

It is not an abstracting service providing summaries of past results /this aspect will be covered by AGRIS: International Information System for the Agricultural Sciences and Technology/, but a system aimed at providing and maintaining current awareness of what is going on in agricultural research, where, and with what resources, aimed primarily at assisting the developing countries, but also generally serving world agricultural development.

2. Background of the Project

The project was defined in 1965 and was presented for the first time at the 1968 Abidjan Conference on Agricultural Research Priorities for the Economic Development of Africa.

The need for a research information system covering the developing countries, with appropriate linkages to similar systems in developed countries, was recognized by the Agricultural Development Conference at Bellagio, in 1970, where a revised form of the CARIS project was discussed.

FAO then submitted a more specific proposal for consideration by the Technical Advisory Committee /TAC/ to the Consultative Group on International Agricultural Research /CGIAR/, and the TAC recommended that the Group support a pilot project to examine the input data required, the methodology proposed for its collection, and the user demand for the information. The Consultative Group endorsed the need for a project along the lines proposed for CARIS, but considered that a pilot project was essential to test its feasibility.

3. The Pilot Project

The pilot project supported by several members of CGIAR has been initiated in March 1972 and terminated in the beginning of 1974 by the publication of directories and an evaluation carried out by the International Development Research Centre.

Fourteen West African countries linked in the West African Rice Development Association /WARDA/ were covered by this pilot project. This large geographical area covers a wide range of conditions, with some 250 research institutions of various sizes and types working in two languages /English and French/.

The pilot project collected information on 237 institutions and 1555 research projects, published in two directories /one in English, one in French/[1].

The pilot project has provided a sufficient diversity of input data, and of data collecting and processing problems, to serve as a valid sample on which to test the methodology and evaluate results in terms of users' requirements. Besides immediate value for the WARDA countries, the pilot project has served as a test for the shaping of the Global CARIS project.

4. The Global CARIS Project

After the results of the pilot project have been evaluated, in terms of methodological approach and of users' requirements, support has been sought for expansion of the project to its global scale, i.e. covering all research done in or on behalf of developing countries.

A proposal has been made to the Technical Advisory Committee of the CGIAR in July 1974. The objective was to collect, process and disseminate information on research institutions, workers, programmes and projects, not only in the form of updated directories and indexes at appropriate intervals, but also to establish a "Question and Answer Service" and a "Service for Selective diffusion of information", which would provide topical information, on request or for subscribers, including full project descriptions and bibliography on these projects from a computer memory data bank.

These services were intended to be provided in liaison with similar research information systems in developed countries, as well as with AGRIS for bibliographical information on research results.

The global project was expected to collect information from some 1600 research institutions and on about 7000 research workers, 8000 research lines /or programmes/, and some 30 000 research projects.

The CGIAR endorsed the project, indicating however, that for a starting phase of two years, the project be limited to the information concerning research institutions, workers and main lines of research /or programmes/.

Several members of the Consultative Group have agreed to support this starting phase for a period of two years. It is foreseen to pursue the CARIS project beyond that phase through regular programme and other extra-budgetary resources.

It is not anticipated in the future to centralise all operations concerning CARIS in FAO, Rome, but to establish a Coordinating Centre in charge of the maintenance of the methodology and of the liaison between several "Local" CARIS Centres /national or regional/ disseminated in the developing countries.

These local CARIS Centres would be in charge of data collecting, indexing and processing, and disseminating of information, through services to users in their respective areas. Data would be then extended to more precise information related to Research Projects.

The CARIS Coordinating Centre would ensure the exchange of information on a worldwide scale by merging information from the local CARIS Centres.

---

[1] Directory of Agricultural Research Institutions and Projects in West Africa - CARIS Project - FAO - Rome - Italy /MI/E2792/F/12.73/1/1200/

Repertoire des institutions et projets de recherche agronomiques en Afrique de l'Ouest - CARIS Projet - FAO - Rome - Italie /MI/E2792/F/12.73/1/1250/.

The collection and distribution of information will be assumed at the National Level by a CARIS Liaison Office which will act as an intermediary between research workers or Research Institutions within these countries and the CARIS Coordination Centre located at FAO or the CARIS Regional Centre to be created.

Taking into account the experience gained through the pilot project, the CARIS methodology has been improved and it will be soon possible to place a complete documentation for setting up a CARIS system at the disposal of countries, centres, regions, etc. including models of questionnaires, instructions, indexing method and computer programme, from punching to printout and camera-ready copy. This documentation will be made available to the countries, centres, regions, etc. in order to establish CARIS local systems.

5. Services

At the present stage of CARIS development the services will take the form of the following directories:

Directory of Research Institutions

This directory will be composed of two parts: a descriptive part and indexes. In the descriptive part, the institutions will be ordered by country. The description will include the following data:

Name of the institution - addresses - longitude, latitude, altitude - climate, soils - supervisory body - governing institution - number of scientists and technicians - languages which could be used for correspondence - experimental fields - specialized equipment - library and documentation - training facilities - publications and regular participation in publications - brief historical - outline general fields of activity - financial support and directly dependent research institutions.

The indexes will include:

an alphabetical list of institutions,

an alphabetical index of fields of activity,

a climatic index.

Directory of Research Workers

This directory will be published as a kind of "who's who" in agricultural research.

The descriptive part will show:

The full name of the research worker - nationality - languages /spoken - written - read/ - academic qualifications - specialities - present activity and function - addresses.

The indexes will include:

an index by fields of science and technology,

an alphabetical index by specialities,

an index by nationality and an index by employing body.

Directory of Research Programmes

The descriptions of these "research programmes" will include the titles of Research Projects belonging to them and the name of the research leader responsible for these projects.These descriptions will be grouped under the name of the research institutions responsible for the programmes, the institutions being ordered by country.

The indexes will include:

an index by research "objects" /plants, animals, soils, climates, products, foods, etc./,

an index by research concerning "activities" /protection of plants, conservation of climate, industrial processing of agricultural products, animal nutrition, etc./,

an alphabetical index covering all classifying and indexing terms used /"objects", "activities", and specific "keywords"/.

In a further stage of CARIS it is foreseen to publish "directories of research projects" and to organize services on request such as "question/answer" service and "selective dissemination of information" according to user profiles, giving information on institutions, research workers, research programmes or research projects.

6. State of progress

In August, the Director-General of FAO invited the developing countries to express their agreement on the participation in CARIS and to designate their CARIS liaison officers. Up to the present time, around 30 countries have replied favourably. At the same time, the developed countries were informed of this procedure.

With the collaboration of these liaison officers, CARIS questionnaires should be filled in by the research institutions and sent back not later than June 1976.

The above-mentioned directories are due to be published by the end of 1976 or the beginning of 1977. Up-datings are foreseen in due course. Starting November 15, FAO consultants will visit the participant countries in order to assist in filling in the questionnaires.

CARIS instructions are available on request.

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Session IV
Part 1
Paper 37

Summary

AGREP - PERMANENT INVENTORY OF AGRICULTURAL RESEARCH PROJECTS IN THE EUROPEAN COMMUNITY

The setting up of a permanent inventory of agricultural research projects in the Member countries of the European Communities /E.C./ was an essential part of the Regulation on the coordination of agricultural research, approved by the E.C. Council of Ministers in June 1974. A working group had already drawn up the plans for AGREP during the years immediately before. An experimental issue containing about 9000 title citations of research projects and composed of a "main list" and various indexes /index of scientists, of research institutes, of subject classification and a KWOC index/ was compiled early in 1975. The next phase will be fully computerized; its output can be expected in mid-1976.

Resumé

AGREP - INVENTAIRE PERMANENT DES PROJETS DE RECHERCHE EN AGRICULTURE DANS LA COMMUNAUTE EUROPEENNE

L'établissement d'un inventaire permenent des projets de recherche agricole dans les pays membres de la Communauté européenne était l'un des points principaux du règlement sur la coordination de la recherche agricole approuvé par le Conseil des Ministre de la Communauté européenne en juin 1974. Un groupe de travail avait déja élaboré les plans de l'AGREP au cours des années précédentes. Une version expérimentale contenant environ 9000 titres de projets de recherche et composée d'une liste principale et de divers index /index des scientifiques, index des instituts de recherche, index des sujets et index KWOC/ a été établie au début de 1975. La phase suivante sera entièrement automatisée; on peut escompter que le système sera opérationnel au milieu de l'année 1976.

AGREP - PERMANENT INVENTORY OF AGRICULTURAL RESEARCH PROJECTS IN THE EUROPEAN COMMUNITY

H. BUNTROCK - G. TREVISAN

1. History

The planning of research presupposes the existence of information on existing research projects. When the study on AGREP was started, some member countries of the European Communities /E.C./ had already produced current catalogues of their projects, while others were about to introduce them. Consequently this seemed to be a favourable time for a joint European undertaking.

In 1971, an ad hoc group of the Agricultural Working Group /AWG/ of the Committee for Scientific and Technical Information and Documentation /CIDST/ examined the situation of agricultural research inventories and studied the possible implementation of an E.C. inventory of research projects. A report was drafted in 1972.

The ad hoc committee of the general directors of agricultural research in the member countries of the E.C., now called "Permanent Committee for Agricultural Research", accepted the proposals forwarded in this report and recommended the setting up of a pilot project. The new member countries which joined the E.C. also decided to participate in this pilot project in 1973, the purpose of which was to test the information collected and the classification used, as well as to produce some major indexes "live" which may be expected to be a model for the later operational phase 1/.

The implementation of a permanent inventory was made an essential part of the Regulation /E.E.C./ No. 1728/74 on the coordination of agricultural research adopted by the Council of Ministers on the 27 June 1974. It is said in article 3, §2, that "the Commission shall keep a permanent inventory of the activities referred to in § 1 1" 2/.

2. Definitions

MICHEL, CHAMBAUD and CORNIER 3/ consider four concepts as essential for the compilation of research inventories in general: research, research programme, research project and objective of the research, and they define them as follows:

1/ AGREP - Permanent Inventory of Agricultural Research Projects in the European Communities. Experimental Issue, 4 vol. /February 1975/

2/ Regulation /E.E.C./ no. 1728/74 of the Council of 27 June 1974 on the coordination of agricultural research. - Official Journal of the European Communities vol. 17, no. L 182, 5 July 1974. Legislation.

3/ MICHEL, CHAMBAUD, CORNIER: Projet de constitution d'un système européen de gestion des projets de recherche en cours Doc. CIDST/108/74.

Recherche: travail entrepris sur des bases systématiques afin d'augmenter le stock des connaissances et de l'utiliser pour mettre au point de nouvelles applications de cette connaissance.

Programme de recherche: série intégrée d'activités de recherches localisées sur un problème central et mettant en jeu un certain nombre de scientifiques et leur personnel logistique pendant une période de plusieurs années.

Projet de recherche: partie élémentaire d'un programme de recherche pouvant être isolé et formant un tout.

Objectifs de recherche: Résultats tangibles devant normalement être l'aboutissement du projet de recherche.

For the purposes of AGREP, research projects were regarded as basic units the definition of which could easier be agreed to than that of wider concepts. Some conclusions on programmes could, however, be drawn from "related projects" registered under tag 143 of the Input Sheet. In this framework the term "agricultural research projects" means research activities:

- which are intended to solve problems within a limited time;
- which concern fields considered appropriate by the financing bodies;and
- for which finance is guaranteed.

3. Scope and coverage

Generally speaking, the scope of AGREP corresponds to that of the present version of AGRINDEX, the world agricultural bibliography sponsored by FAO. It concerns both fundamental and applied research and deals with food and agriculture in the widest sense of the words, thus including agriculture stricto sensu, veterinary science, fisheries, forestry, food science, technology and nutrition.

There is obviously much conceptual overlap with fundamental sciences, such as biology, chemistry, physics and social sciences, as well as with other applied sciences, such as soil science, climatology and meteorology, economy, etc.

The geographical coverage of AGREP is at present limited to the member countries of the European Communities and the Commission. This means that AGREP would /preferably/ have to establish contacts with other inventories, e.g. CRIS and CARIS, and exploit them in order to supplement the E.C. inventory as comprehensively as possible when carrying out retrieval searches.

4. Organisation and objects

The AGREP is laid out as a two-tier system. National focal points collect inputs from their countries and forward it to the Commission of the European Communities, which is responsible for data processing and publication of the data.

During the experimental phase /see §7/ research projects are indexed on the basis of a facet classification system with an average classification depth of 6 to 8 codes per project. AGREP philosophy is to provide users with a minimum set of data about research projects /see annex 1./ and refer them to national focal points, relevant research organisations or involved scientists for more information.

5. Users

Four groups of users may be distinguished: coordinators, researchers, extension workers /and document specialists and librarians as intermediaries/.

Coordinators or managers are persons either employed in research administration or who are responsible for research policy. Inventories are indispensable sources of information for their work. The AGREP inventory will enable them for the first time to keep a systematic record of agricultural research projects in all Community countries and hence create the basis for agreements extending beyond national frontiers. Overlaps, gaps and related projects may therefore be treated within a broader framework which allows room for harmonization.

AGREP will make it possible for scientists instructed to carry out projects to obtain information on related themes and projects already under way, find references for contacts, and see their work in the context of agricultural research as a whole.

Extension workers in advisory services for farmers could use AGREP as a referral tool and establish direct contacts between production and processing /farms and industry/ on one hand and research on the other hand. This would be in full accordance with the above mentioned Council Regulation which states that "the earliest possible utilization by farmers of the results of this research must be ensured". The selective indexes of AGREP would enable the advisory workers to find out which relevant research institutes are potential problem-solving units on a local, national or European level.

For document specialists and librarians, the AGREP inventory would bring together several sources of information, and thus enhance the value of each individual national source, and generally simplify the task of searching for information.

6. Input data

The inventory will be based upon a set of input data as contained in the AGREP INPUT SHEET /annex 1./. This should be /together with the attached scope notes/ self-explanatory. More detailed information is given in the Cataloguing Rules /doc. No. 2598/XIII/73/, being modified for the purposes of the next phase of action.

7. Experimental issue

In 1975 an experimental issue was prepared from relevant input collected in the period September 1974 - March 1975.

The experimental issue is not fully representative of the state of agricultural research in all the member countries, and has to be regarded as a performance test which will provide system analysts with necessary experimental data.

The experimental issue contains four volumes:

Vol. I	Main List and List of Scientists
Vol. II	List of Research Organisations participating in AGREP Experimental Issue
Vol. III	Classification Index
Vol. IV	Keyword-out-of-context /KWOC/ Index

Analysis carried out up until now:

- the number of research projects per scientist /52% of the researchers were engaged in one project, 18% in 2 projects, 10% in 3 projects/;

- the repartition of research projects per subject field /on national and Community level/;
- qualitative evaluation of indexing and translated titles.

8. Outlook

Expected 1975 input is:

	Country	Number of Research Projects to be delivered and/or updated
BE	Belgium	800
DA	Denmark	1000
EI	Ireland	1000
FR	France	1000
GE	Fed. Rep. of Germany	6000
IT	Italy	1200
NL	The Netherlands	3000
UK	United Kingdom	4000
	Total	18 000

Planned output and services are:

- Main list

  Contains all the input data and is ordered according to
    subject tags
    AGREP code
- List of research organisations
- List of sponsoring organisations
- List of financing bodies
- List of scientists
- Classification index
- List of significant words
- Retrievable magnetic tape /retrieval, national inventories, group profiles etc., on request/.

AGREP INPUT SHEET page 1

Permanent Inventory of Agricultural Research Projects in the European Community.

AGREP CODE (duplicate col. 1 - 15 in all records)

[illegible]	Research institute	[illegible] year	Project No.	15
1	4 9	10	11 14	15

N: New
R: Replaced or changed
C: Confirmed
D: Deleted

16 18		Ind exer	Subj lies	Update year mon	Internal National Code	Publications
0 6 0		21 22	23 24	25 26	27 38	39 0: No 1: Yes

TITLES OF THE PROJECT

16 18	19		21 22	23	24 Title in original language (if not English)
1 0 7	Del			—	

16 18		21 22	23	24 English title
1 0 8		E N	—	

RESEARCHERS

16 18			
1 0 9		21 Project leader	21 Associate
		21 Associate	21 Associate
		21 Associate	21 Associate

CLASSIFICATION CODES

16 18		21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61	
0 7 3		Facet A A	A	A	A	A					
0 7 4		Facet B B	B	B	B	B	B	B	B	B	B
0 7 5		Facet C C	C	C	C	C					
0 7 6		Facet D D	D	D	D	D					

RESOURCES AND FINANCING

	Del		Duration years	Annual Budget Data in National Currency			Scientific Staff (man months)
				Total	Manpower	Materials etc.	
16 18	19		21 22	23 31	32 40	41 49	50 53
1 3 0							

1 2 0		21 Sponsoring Org. 28	29 36	37 44	45 52	53 60
1 2 1		21 Financing Body 28	29 36	37 44	45 52	53 60

			AGREP Codes - Related Projects				
16 18	19		21	35		51	
1 4 3							

DC 16 04 011 0001

	Project Description and/or additional information [illegible]
2 0 0	

EXPLANATORY NOTES

Input sheets should be filled in by typewriter only. Dotted boxes are obligatory.

AGREP CODE

Position 1 - 2	:	Country (Codes see cataloguing rules)
Position 3 - 8	:	Research institute (Codes see List of Research Organizations)
Position 9 - 10	:	Start year
Position 11 - 14	:	Project n⁰ (Current project n⁰ per focal point)
Position 15	:	Status of the project: N : New R : Reoriented or changed (Title and/or other entries changed) C : Confirmed (Updated without any changes) D : Deleted (Project abandoned or accomplished)

Delete Code

Position 19 (Del. column)	To be used for updating only (see cataloguing rules)

Tag 060

Position 21 - 22	:	Indexer (To be filled in by indexers only)
Position 23 - 24	:	Supplier (National focal point acting as input supplier, codes see cataloguing rules)
Position 25 - 28	:	Update year month) (To be filled in only if different from start year, given in AGREP code, position 9 - 10)
Position 29 - 38	:	Internal national Code (To be filled in only if different from project n⁰ of AGREP code, adjusted to the right)
Position 39	:	Publications 0 (No paper exists) 1 (Papers exist, regardless of their availability)

Tag 107	:	Title in original language (Note: special characters of E.C. languages should be used without any transliteration)
Position 21 - 22		Language code (see cataloguing rules)
Tag 108	:	English title
Tag 109	:	Names of researchers (See cataloguing rules)
Tag 73 - 76	:	Classification codes (For indexers only)
Tag 130	:	Resources and financing
Position 21 - 22		Duration (Estimated duration of the projects in years)
Position 23 - 49		Annual budget in national currency (Only whole figures, adjusted to the right, no currency indication)
Position 50 - 55		Scientific staff in man/month (Per updating year, whole figures only, adjusted to the right)
Tag 120 and 121	:	Sponsoring organization(s) and financing body(ies) (To be filled in only if different from research institute of AGREP code)
Tag 143		AGREP codes of related projects
Tag 200		Additional information and/or project description (Additional information for indexers)

J.M. DETHOOR,
Directeur,
Office de l'Informatique
UNESCO

Session IV

Part 1

Paper 38

Summary

A COMMON REGISTER OF ACTIVITIES IN ECONOMIC AND SOCIAL DEVELOPMENT /CORE/

The Inter-Organization Board for Information Systems and Related Activities is a common body grouping most of the organizations of the U.N. System.

One of its major targets is to promote a common approach to recording and reporting assistance for development to assist in decisions thereon and in management of programmes.

It has been felt that a common register of projects would be a most useful way of facilitating programming and management. This register /CORE/ is in an experimental phase. It now includes more than 10 000 projects for which a variety of information is available /agencies responsible for execution, source of fund, topic, budgetary dates, etc./.

The project is watched with much interest by Member States, ECOSOC and the various agencies.

Résumé

LE REGISTRE COMMUN DES ACTIVITÉS DE DÉVELOPPEMENT ECONOMIQUE ET SOCIAL /CORE/

Le Bureau interorganisations pour les systèmes d'information et activités annexes est un organisme commun groupant la plupart des institutions du système des Nations Unies.

L'un de ses objectifs principaux est de favoriser l'adoption d'une approche commune dans l'enregistrement et la communication des informations sur l'aide au développement pour faciliter la prise de décisions en cette matiere et la gestion des programmes.

On a estimé qu'un registre commun des projets serait d'une grande utilité et faciliterait la programmation et la gestion. L'établissement du registre /CORE/ n'a pas dépassé la phase expérimentale. Le registre comprend maintenant plus de 10 000 projets sur lesquels on peut se procurer diverses informations /institution chargé de l'exécution, source de financement, objet, exercices budgétaires, etc./.

Le projet est suivi avec beaucoup d'intérêt par les Etats membres, le Conseil économique et social et les diverses institutions.

LE REGISTRE COMMUN DES ACTIVITES DE DÉVELOPPEMENT ECONOMIQUE ET SOCIAL /CORE/

J.M. DETHOOR

Introduction

CORE signifie "COMMON REGISTER OF ACTIVITIES IN ECONOMIC AND SOCIAL DEVELOPMENT", soit en français: "Registre commun des activités de développement économique et social".

Le besoin, ressenti à travers tout le système des Nations Unies, d'adopter des approches communes et de disposer d'informations compatibles et complémentaires, est l'une des raisons qui ont conduit à la création, en 1971, du Bureau inter-organisations pour les systèmes d'information et les activités connexes. Cet organe du Comité Administratif de Coordination regroupe la majeure partie des organisations du système des Nations Unies.

Très vite, le Bureau a porté son attention sur l'étude d'un système commun d'information regroupant certains renseignements fondamentaux sur le système CORE.

Objectifs

Les objectifs de ce système consistent, d'une part, à mettre en oeuvre une méthode unique d'enregistrement et d'élaboration des données relatives aux projets d'assistance au développement, de façon à faciliter la prise de décision et le management des programmes et, d'autre part, à encourager l'échange des informations utiles à cet égard.

Le Conseil Economique et Social a plusieurs fois marqué son intérêt pour le projet. Il en va de même de nombreux Etats Membres.

Evolution du projet

Pendant l'année 1974, le projet CORE était dans une phase dite "pilote" dans laquelle les données enregistrées étaient limitées à un noyau d'informations sur les projets financés par le Programme des Nations Unies pour le Développement. La phase dite "expérimentale" a commencé au début de 1975. Elle consiste à compléter les informations disponibles, aussi bien en augmentant le nombre des projets qu'en fournissant plus de données pour chacun de ces projets, et à expérimenter le système pour en évaluer l'intérêt potentiel.

Il est prématuré de se prononcer aujourd'hui sur la fin de la phase expérimentale qui pourrait se situer dans la seconde moitié de 1976 ou en 1977.

Nature et volume des informations

Pour chaque projet, sont enregistrées des informations dites "de base" et des informations dites "optionnelles". Les informations de base constituent un profil général du projet. On y trouve les objectifs du projet, le champ d'activité, le/s/ pays bénéficiaire/s/, l'organisme de financement, l'organisme d'exécution, des éléments de planification et bien sûr des éléments financiers.

Les informations optionnelles sont, comme leur nom l'indique, laissées à l'initiative de chacune des organisations contributrices.

Le système CORE devrait couvrir à la fin de l'année environ 16 000 à 17 000 projets du système des Nations Unies pour lesquels les informations de base seront progressivement complétées au cours de la phase expérimentale et inclure peut-être, par la suite, des projets d'assistance bilatérale.

Caractéristiques techniques générales

Le système lui-même est constitué d'un logiciel documentaire /STAIRS/ accompagné de modules complémentaires destinés à préparer les entrées et à effectuer quelques prétraitements /statistiques, évaluations diverses/. Il est prévu de mettre à la disposition de chaque organisation l'ensemble des données de façon à permettre non seulement une exploitation centralisée, mais aussi une utilisation décentralisée de l'ensemble du fichier.

Conclusion

Le système CORE n'a rien d'exceptionnel sur le plan technique, mais il présente un intérêt certain sous l'angle de la coopération et de la normalisation établies entre des organisations dont les méthodes de gestion et de la planification, les structures administratives et les objectifs sont différents. Enfin et surtout, il n'est pas nécessaire de souligner le profit que tireront les Etats Membres et les organisations des informations qui devraient être rendues disponibles dans la phase opérationnelle.

DISCUSSION, Session IV, Part 1.

Moderator: J. MEYRIAT,
Directeur des
Services de Documentation
de la Fondation nationale des sciences
politiques, France

J. MEYRIAT: Nous allons entrer tout de suite dans cette quatrième session qui nous propose deux thèmes principaux: d'une part l'intérêt de l'échange international, et d'autre part les problèmes qu'il soulève. Etant donné que ces problèmes sont très nombreux, je voudrais suggérer aux orateurs de concentrer leurs interventions davantage sur les problèmes gue sur la valeur de la coopération internationale. J'espère que nous sommes à peu près d'accord en principe sur la valeur et je crains que nous le soyons beaucoup moins sur les modalités pratiques de cette coopération et sur la solution à apporter aux problèmes qu'elle soulève. Peut-être, en nous concentrant sur ces problèmes, nous arriverons à avancer davantage dans leur discussion.

Discussion of the paper by W. FOSTER

Mme. WOLFF-TERROINE: Je m'excuse, ma question n'a pas trait au caractère international, mais plutôt à un problème général. S'il y a bien un domaine où la recherche est multidisciplinaire, c'est bien le domaine du cancer. Où sont les limites de la biochimie, de l'humanité, de la virologie, de la radio-biologie, etc. et du cancer? Je voudrais donc poser la question suivante au Dr. FOSTER: Y a-t-il une compatibilité prévue entre ce système de recherches en cours sur le cancer et les autres bases de données du SSIE? et, à la limite, est-ce qu'il n'aurait pas été plus intéressant, toujours vu ce caractère multidisciplinaire, de renforcer les autres bases de données du SSIE plutôt que de créer quelque chose de nouveau?

W. FOSTER: I am glad that you have raised this question, because it is an important one to us. We have proceeded very carefully in the integration of the work on the ICRDB programme with the work of the SSIE and have established the vocabulary in a compatible manner with the existing vocabulary and, in fact, the retrieval procedures being used in the programme are based on the SSIE retrieval methods and the hardware and software available. There are some modifications being developed, but in general the systems are entirely compatible and will be used to supplement one another.

E. DE GROLIER: C'est une question assez analogue: Y a-t-il compatibilité entre le système adopté par votre Institut et les systèmes qui existaient déjà par exemple, le Réseau d'Information Cancérologique centré autour de l'Institut Gustave Roussy en collaboration avec quelques pays européens, ou bien les parties cancérologiques d'EXCEPTA MEDICA?

W. FOSTER: As I mentioned, the "Institut Gustave Roussy" is participating actively in this programme and we are working very closely together with Prof. FLAMANT who will be collecting the descriptions of clinical treatment protocols for our data base. We are having active discussions with as many groups as we can identify and find the time to work with them in order to make sure that the efforts of this programme are closely tied to those of others and that no duplicate work being done. I don't know if I answered all the aspects of your question, if I did not, would you please repeat it.

E. DE GROLIER: C'était plutôt sur le vocabulaire ou les classifications que vous utilisez: est-ce qu'il y a une recherche de concordance ou de compatibilité avec les vocabulaires et les catégories utilisés par EXCEPTA MEDICA ou par le Bulletin signalétique français qui regroupe l'information cancérologique?

W. FOSTER: Not yet, although this is an area that we want very much to pursue. I hope that we will have an opportunity to sit down with the representatives of each of these groups and talk about the problems of compatibility and how to interface the vocabularies. As the Symposium Chairman indicated, this would be an excellent subject for further discussion in an international forum as well.

Discussion of the paper by E. TEJEDA

M. EL HADI: I would like to comment on two points which have been raised in this paper. The first point concerns contacting the user or the feeders of the information, the second point concerns the broadness of the activities themselves. In connection with the first point, I would like to state actually the problem which confronts us when we design a questionnaire and send it to the research workers in the field and we do not get a good response from them. This situation has been mentioned here many times. What could be the most appropriate way for us in designing a system for compiling information on ongoing research? Is it to use an intermediate means or to contact the researchers themselves? - I think that using the intermediate means i.e. the research officers, would be more effective for this collection especially in helping the research workers in filling the data sheets. The second point concerns the broadness of the service. It seems to me that, if we are in the developing countries such as Mexico, Lebanon, Morocco or Ghana, etc. we may take a very ambitious role in trying to contact all researchers all over the world spending a lot of money and energy. It would be better for us to confine ourselves to national boundaries since other countries have similar services which can be linked with us through associations and organizations either regional or international. Therefore, I propose to my friend from Mexico, first to fill the gaps existing in his country and after that in Central and Latin America, then to go to other parts of the world. I am sure he can find a lot of resources available on tropical literature on ongoing research.

P. TEJEDA: We have learned during all the past sessions and in this presentation, that we should be more precise about some of the projects that UNISIST should consider and we propose for instance that the index of ecological tropical research be considered as a project for UNISIST.

Discussion of the papers by N.St.DUMITRESCU and H. BUNTROCK

G. FOSSI: Le Président de ce Symposium m'a invité à faire une petite communication informative à ce stade en guise de commentaire sur ces deux projets qui viennent de nous être décrits. J'appartiens au Centre de développement de l'OCDE, et je représente un groupe de travail composé par les représentants de quatre associations d'instituts de recherche et de formation qui s'occupent de problèmes de développement: le Conseil Latino-américan de recherche en sciences sociales /CLACSO/, l'Association africaine des instituts de recherche /CODESRIA/ l'Association asiatique des instituts de recherche pour le développement et l'Association européenne, la dernière qui vient d'être créée de ces mêmes Institutions de recherche et de formation en matière de développement. Ce groupe de travail a donc été créé entre ces quatre associations pour mettre au point une fiche descriptive pour les études sur le développement et en particulier les recherches en cours. Cette fiche descriptive sera distribuée à environ 750 unités de recherche qui ont déjà été recensées dans le cadre des travaux du

Centre de développement de l'OCDE en collaboration avec ces association. Trois répertoires sont en traind'être élaborés et sont déjà sur ordinateur, l'analyse étant faite à l'aide de ce macrothesaurus en matière de sciences économiques et sociales qui a été mentionné ce matin. Ce macrothésaurus a été également choisi par le DEVSIS, le projet dont il n'a pas été encore question aujourd'hui mais je crois qu'il sera sans doute mentionné, car il est patronné par de nombreuses organisations dont l'UNESCO.

K. BJERKE: In Denmark, we have established a committee - of which I am the Chairman - for the registration of social science research. We are naturally interested in the AGREP system and I would like to ask one question about it. When we work with AGREP, we have problems with the classification. For Denmark the classification has been made in Denmark, but I see that in the pilot phase, the classification was made by Van den BERGH in the Netherlands, and I should like to know what are you planning to do in the further development of AGREP. Would you prefer the countries to make their own classification or would you prefer a centralized classification?

H. BUNTROCK: I would like to avoid a misunderstanding. The classification system for AGREP, and also for the experimental issue, is of course a classification system which is used for all contributions within AGREP. The problem you mentioned is, who did the real indexing? - Well, I think this was a matter of division of labour of mutual agreement and perhaps is of less general interest, so I propose that we discuss this after the meeting.

M. EL HADI: It was interesting to listen to the discussion given by Mr. DUMITRESCU concerning the CARIS system. I found many similarities between the CARIS system and the AINAI system which we are developing right now, and I think the characteristic of the CARIS system is that it took into consideration the developing countries from the base. They started on a national basis and after that they coordinated the work on a regional and international basis. Considering the other systems like DEVSIS, UNISIST and NATIS, since they are already directed to the developing countries, why don't they start on a national basis and after that coordinate the work on a regional basis, until they reach the international basis, the ultimate goal to which we are striving?

H. HOGEWEG-DE-HAART: From the point of view of a national centre, though in quite another part of science, I would like to say that I fully agree with the idea of international organizations taking the role of a referral centre.

J. MICHEL: Il est regrettable que deux organismes internationaux qui ont commencé pratiquement à travailler en même temps sur un projet tout à fait identique et dans lequel des pays sont engagés à faire le même "input", se soient engagés sur des voies aussi différentes à un point tel qu'actuellement les deux systèmes soient incompatibles. Puis-je exprimer le souhait que, dans un avenir très proche, ces deux organismes se rencontrent pour assurer un minimum de compatibilité et puis-je demander soit à Monsieur BUNTROCK, soit à Monsieur DUMITRESCU de nous dire ce qui est prévu à ce sujet.

N.St.DUMITRESCU: Je réponds à la question de Monsieur MICHEL. Lorsque la FAO a projeté le système d'information sur CARIS, elle a dû prendre en considération les besoins des pays en voie de développement et a donc conçu un système qui donne un nombre assez grand de renseignments sur les recherches. Je vous signale que des mesures on été prises pour assurer la compatibilité et la concordance entre CARIS et AGREP, des experts de ces organismes vont se rencontrer les jours suivants pour mettre au point tous les problèmes qui existent entre ces deux systèmes.

A. ROMDHANE: Il est important pour les pays en voie de développement, surtout pour ceux qui commencent à installer des systèmes pour l'information sur la recherche en cours, que ce soit en agronomie ou ailleurs, de voir plus clair. Est-ce que CARIS fait partie officiellement ou officieusement du programme général de l'UNISIST? L'UNISIST recommande-t-il ce système aux pays en voie de développement? Il y a trop de systèmes, et les pays en voie de développement ne peuvent pas se permettre de jouer aux systèmes. Est-ce que le responsable

de l'UNISIST peut nous dire ce qu'il en pense?

A. WYSOCKI: I would like to comment on this statement. First of all, within the framework of UNISIST, we started with the published information. It was our first approach. Then, we attacked the problem of data information, mainly the evaluated data, and reached an agreement with CODATA for a long-term programme. Now we are starting with information on ongoing research. Therefore, as far as compatibility is concerned, I can say: AGRIS, the system on bibliographic information established by FAO is developed within a conceptual framework of UNISIST and in conformity with the UNISIST recommendations and guidelines. So is INIS, the system established by IAEA. As far as information on ongoing research is concerned, however, UNISIST started only with the first guidelines on the inventory of ongoing research and we would like to give a follow-up to this symposium and develop all the necessary recommendations and guidelines concerning the compatibility of this system on ongoing research and to encourage international co-operation in this field. Is CARIS developed within the UNISIST framework? - not yet. But I hope, that as a follow-up of this meeting, we will try to harmonize or unify, if possible, the methods of information handling on ongoing research. CARIS, of course, I hope, will be part of the systems developed within the UNISIST conceptual framework.

H. BUNTROCK: I would like to come back to the question raised by M. MICHEL. I have complete sympathy with his concern that CARIS and AGREP should create as much compatibility as possible, but I would like to draw your attention to the fact that their scope definition, their user population and therefore their task and their approaches were different from the starting point. As far as the scope definition is concerned, I have always understood that CARIS deals only with agricultural research in and perhaps for developing countries; I must agree that the second point is not very clear and an agreement has to be found. As far as the approach is concerned, in the European Communities, national input centres are already in existence or are being established for the purposes of providing input to AGREP, whereas for CARIS this is not yet the case.I agree that this does not answer the question on the complexity of the two systems. Perhaps it seems paradoxical that the system aimed to serve developing countries is much more complex than the one aimed at serving our developed countries. Please keep in mind, however, that our system is a two level system, and you must see the whole national system for input and distribution of output and the general information location system which is AGREP. Perhaps, to point out once more what Mr. DUMITRESCU said, we have managed to arrange for the expert who is responsible for the development of the software for CARIS to meet the day after tomorrow with our experts concerned with the development of the software for AGREP and I hope that we will be able to draft at least a minimum compatibility set.

Discussion of the paper by M. DETHOOR

M. EL HADI: I would like to ask a question concerning the coordination within UNESCO itself. For example, we heard about the data retrieval system developed by the Social Science Division and now about the CORE system. I feel that both systems could be developed together in harmony rather than developing a lot of systems separately within the same house which confuses the users. I would like to ask Mr. DETHOOR what is the harmonious way and the coordinating body which can harmonize the existing systems within the house?

J. DETHOOR: Je crois, Monsieur, que votre question concerne fondamentalement celle de la coordination de DARE et CORE, et plus généralement la coordination à l'intérieur de l'UNESCO. Et bien, en ce qui concerne DARE et CORE, je voudrais d'abord,qu'il soit bien clair que le système CORE que je vous ai décrit très rapidement, n'est pas développé à l'intérieur de l'UNESCO. L'UNESCO est l'une des organisations participantes et sa participation a simplement consisté à fournir une partie des informations déjà stockées pour les systèmes internes de gestion, concernant les projets. DARE est un système assez différent qui, comme on l'a dit tout à l'heure, réunit les informations sur les instituts de recherche, sur les projets de recherche, sur les experts et sur les publications

en matière de recherche, alors que CORE traite des projets opérationnels du système des Nations Unies. Je crois qu'il y a là deux domaines assez différents. En ce qui concerne la coordination plus générale à l'intérieur de l'UNESCO entre nos activités aussi bien d'informatique que d'information, nous nous employons à essayer d'améliorer la situation et qu'un certain nombre de mesures de coordination sont déjà prises ou sont en cours d'être prises, mais cela dépasse un peu l'objet de ce colloque.

P. LÁZÁR: Two short questions: first, a technical one: for whom are the data available? Second, what is the relationship between CORE and DEVSIS?Could you tell us something about this point?

J. DETHOOR: En ce qui concerne la disponibilité des données, la méthode employée pour le développement de CORE a fait l'objet d'un ensemble de tatonnements et finalement, devant la complexité de la situation dans ces organisations internationales, une méthode empirique a été adoptée, elle a consisté à dire: commençons déjà par mettre des données ensemble, testons l'usage qu'on peut en faire, ça ne coûte pas cher puisque ce sont pour la plupart des sousproduits de systèmes internes existants et puis utilisons un software existant quitte à le modifier un peu s'il le faut. Pour le moment donc, ces données sont disponibles, naturellement pour les agences et éventuellement pour un état qui en ferait la demande.Le problème de la confidentialité éventuelle de certaines informations se pose pour les projets envisagés et fait l'objet en ce moment de discussions mais il n'y a pas eu encore de décision à cet égard. En ce qui concerne les relations entre CORE et DEVSIS, je pense que Mr. WYSOCKI est plus informé que moi et pourra me corriger, à ma connaissance il n'y a pas de relations.

A. WYSOCKI: J'aimerais bien vous corriger. Tout d'abord ce sont des relations amicales, ensuite DEVSIS fait l'objet, pour le moment, d'une étude de faisabilité qui tient compte des systèmes existants, et le système CORE est pour le moment considéré comme faisant partie de cette étude DEVSIS.

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Session IV

Part 2

Paper 39

Summary

TEN YEARS OF EXCHANGE OF INFORMATION ON ONGOING RESEARCH IN PROGRESS WITHIN A SYSTEM FOR INTERNATIONAL COOPERATION: INTERNATIONAL ROAD RESEARCH DOCUMENTATION /IRRD/

The author describes the background of the setting-up of a system for information exchange on ongoing research which was set up in 1965 with the participation of nine countries and which, after the first pilot exchanges, rapidly expanded to a complex international system /member countries of the "International Road Research Documentation" within the framework of the OECD, associate countries of the IRRD, countries covered by the International Road Federation/ totalling 72 countries in 1974.

The processes for collecting information are described. Data and examples illustrate the development and follow-up of these exchanges during ten years.

Taking the French organization, to which he belongs, as an example, the author stresses the repercussions of this international organization on the functioning of a member organization in the field of research, documentation and dissemination of results.

Résumé

DIX ANNEES D'ECHANGES D'INFORMATIONS SUR LES RECHERCHES EN COURS DANS UN SYSTEME DE COOPERATION INTERNATIONALE: LA DOCUMENTATION INTERNATIONALE DE RECHERCHE ROUTIERE /DIRR/

L'auteur décrit les bases de départ d'un échange d'informations sur les recherches en cours, qui, créé en 1965 entre neuf pays, s'est étendu rapidement, à la suite des premiers échanges pilotes, à un ensemble international complexe /pays membres de la "Documentation Internationale de Recherche Routière", dans le cadre de l'OCDE, pays associés à la DIRR, pays couverts par la Fédération Routière Internationale/ représentant en 1974 au total 72 pays.

Les procédures permettant le recueil d'informations sont décrites. Des chiffres et des exemples illustrent le développement et le suivi de ces échanges sur dix ans.

Prenant pour exemple l'organisme français dont il fait partie, l'auteur met l'accent sur les répercussions de cette organisation internationale sur le fonctionnement d'un organisme membre, au plan de l'organisation de la recherche, de la documentation et de la diffusion des résultats.

DIX ANNEES D'ECHANGES D'INFORMATIONS SUR LES RECHERCHES EN COURS DANS UN SYSTEME DE COOPÉRATION INTERNATIONALE: LA DOCUMENTATION INTERNATIONALE DE RECHERCHE ROUTIERE /DIRR/

R. SAUTEREY

1. Généralités

1.1 Présentation générale du système

Le système international d'échange d'information que nous allons tenter de décrire dans la présente communication est l'oeuvre commune:

a/ de la Documentation Internationale de Recherche Routière /DIRR/, créée dans le cadre de l'OCDE,

b/ de la Fédération Routière Internationale /IRF/.

Nous rappelons:

que la DIRR est un système international de documentation en matière de construction et entretien des routes, trafic, sécurité et transports routiers. Créée le ler janvier 1965 par 9 pays, elle en réunit aujourd'hui 15 /Allemagne Fédérale, Autriche, Belgique, Canada, Danemark, Espagne, France, Irlande, Japon, Norvège, Pays-Bas, Portugal, Royaume-Uni, Suède et Suisse/ et bénéficie depuis de l'association du Transport Research Board des Etats-Unis, par l'intermédiaire de Highway Research Information Service /HRIS/,

que l'IRF est une organisation internationale dont les buts sont de propager la connaissance des avantages économiques et sociaux de la circulation routière dans le monde et de recueillir, assembler et diffuser les éléments d'information statistiques, techniques, économiques, éducatifs et sociaux, couvrant en 1974 57 pays auxquels s'ajoutent les 15 pays membre de l'OCDE, soit un total de 72 pays.

Dès les premiers travaux du groupe de travail, qui aboutit à la création de la DIRR, est apparue la nécessité d'incorporer dans le champs documentaire à couvrir par le système, des informations sur les recherches en cours.

On peut même penser que ce fut là l'élément déterminant qui conduisit à la création de la DIRR; en effet, certains des organismes fondateurs, quoique sensibles au double emploi, avaient le sentiment que les besoins de documentation concernant la littérature technique publiée, pouvaient en fait être couverts par les services traditionnels de documentation dont chaque organisme disposait, alors qu'au contraire le recueil d'informations sur les recherches en cours n'était pas concevable en dehors d'une structure internationale spécialement adaptée à cet objectif.

Parallèlement, l'IRF avait également ressenti le besoin d'un échange d'informations sur les recherches en cours et avait entrepris, en 1964, une enquête mondiale visant à recenser toutes les recherches en cours, qui a couvert 17 pays la première année.

Des contacts furent pris entre les deux organisations, qui aboutirent en juin 1965, à un accord de coopération qui entra en vigueur dès 1966, et subit quelques aménagements et modifications dans les modalités d'application en cours les années suivantes.

1.2 Principes de base

Cet accord de coopération repose sur les principes de base suivants:

Chaque membre de la DIRR recueille les informations relatives aux recherches en cours dans son pays, grâce à une enquête /triennale/ comprenant des visites à tous les organismes travaillant dans le domaine routier. Il transcrit les informations recueillies sur un "formulaire d'enquête" 1/ contenant le titre, l'adresse et une brève description de la recherche caractérisée par les mots-clés 2/ appropriés et les transmets, comme les "fiches-documents" aux trois centres de coordination linguistique correspondants /français, anglais, allemand/ pour inclusion dans le fonds documentaire DIRR.

Après traduction vers l'anglais par le "Transport and Road Research Laboratory" du Royaume-Uni, ces formulaires d'enquête sont transmis à l'IRF qui les publie dans son volume annuel "World Survey of Current Research and Developpement on Roads and Road Transport", grâce au traitement assuré par le Highway Research Information Service /HRIS/ qui les a incorporés dans sa mémoire documentaire.

En échange, la DIRR reçoit, au centre de coordination de langue anglaise les "fiches-recherches" correspondant aux recherches recensées par l'IRF au cours de son enquête effectuée dans les pays non-membres de la DIRR, dans les conditions similaires à celles effectuées par la DIRR dans les pays membres /toutes les modalités de ces enquêtes ont été définies par accord entre les deux organismes/.

Pour couvrir les recherches aux USA, le HRIS traite l'ensemble des informations gouvernementales et privées, notamment celles qui sont réunies sous l'égide du Départment of Transportation /DOT/.

2. Fonctionnement du système de recueil d'informations

Le système, dont les grandes lignes ont été décrites, est très complet et est aussi très complexe.

Il associe des organismes et organisations dont les objectifs, les types d'activité, les langues, les habitudes de penser, la démarche de "recherche", présentent de notables différences.

Il a donc fallu, pour obtenir un système cohérent décrire avec minutie toutes les procédures.

Nous allons tenter de décrire, de façon aussi claire et concise que possible, le principe de ces procédures.

2.1 Les enquêtes

L'enquête prend essentiellement la forme d'une enquête détaillée triennale complétée par des mises à jour annuelles.

Au cours de l'enquête détaillée, toutes les organisations sont en principe visitées et toutes les personnes responsables des recherches sont interrogées; par contre, pour les mises à jour annuelles, on ne recherche que les informations relatives aux nouveaux projets ainsi qu'à ceux qui ont été terminés ou abandonnées.

1/ Ce formulaire d'enquête est conçu de structure strictement identique à celle des "fiches-documents".

De la même façon, lorsqu'en 1975, la décision fut prise d'incorporer dans le champs documentaire les programmes de calcul automatiques, les bordereaux d'entrée correspondants ont été conçus de structure strictement compatible.

2/ Mots-clés extraits d'un thésaurus trilingue /F/E/D// élaboré dès 1964, dans la DIRR et opérationnel au Ier janvier 1965.

2.11 Domaines à couvrir

Les enquêtes doivent couvrir au minimum tout le domaine DIRR /défini de façon très précise par un document ad hoc/.

Un interface a été établi entre les domaines DIRR et HRIS.

Le domaine couvert par l'IRF étant plus vaste que celui couvert par la DIRR et le HRIS, il a été convenu que les enquêtes DIRR couvriraient l'ensemble du domaine IRF, les fiches relatives à ces domaines connexes n'étant pas incorporées dans le circuit propre à la DIRR.

De la même façon, tout membre DIRR peut utiliser ces mécanismes pour entreprendre des enquêtes similaires dans des domaines connexes, en utilisant alors les fiches ad hoc.

Un projet de recherche recensé au cours de ces enquêtes sera effectivement incorporé:

- s'il tombe dans le domaine couvert,
- s'il présente un intérêt plus qu'essentiellement local,
- s'il est en cours /c'est-à-dire en fait qu'un financement a été accordé/,
- si les informations relatives aux recherches et à leur résultat sont disponibles à tout chercheur extérieur à l'organisation qui les entreprend.

2.12 Procédures détaillées

L'enquête commence par une lettre explicative adressée à chaque organisation couverte, et comportant les annexes suivantes:

- l'exemplaire de la définition des domaines couverts par la DIRR et l'IRF /et des domaines connexes qu'on souhaite éventuellement couvrir/,
- copies des "fiches-recherches" enregistrées comme "en cours","en attente", "futures" et "recherche terminée" 3/ préparées par ladite organisation au cours de l'enquête précédente,
- des formulaires d'enquête vierges destinées aux nouveaux projets.

Ensuite, le responsable de l'enquête effectue, si nécessaire, une visite personnelle à chaque organisation, pour:

- interroger les responsables de recherche,
- donner un avis sur le choix des sujets de recherche à incorporer dans l'enquête,
- résoudre les difficultées particulières,
- obtenir des informations relatives à d'autres organisations susceptibles de prendre part à l'enquête.

2.13 Contenu des "fiches-recherche"

Les informations suivantes doivent être recueillies:

- titre et code du projet de recherche,
- organisation responsable de la recherche,
- nom des chercheurs,
- organisme subventionnant la recherche,
- estimation du coût,

3/ voir définition de ces termes au § 2.13

- résumé analytique,
- rapport publié ou en cours de publication,
- date de début,
- date prévue pour la fin du projet,
- état actuel.

A la date à laquelle les informations sont fournies, l'état actuel de la recherche doit être précisé en choisissant l'une des expressions suivantes:

- "en cours" - c'est-à-dire que la recherche est poursuivie de manière active;
  si nécessaire, on pourra préciser "presque terminée" ou "vient de commencer",
- "futur" - un financement a été accordé, mais la recherche n'a pas été commencée,
- "terminé" - la recherche est terminée et les résultats ont été publiés,
- "recherche terminée" - le rapport est encore en préparation,
- "abandonné" - les recherches sont arrêtées et il est peu probable qu'elles reprennent dans un proche futur,
- "en attente" - les recherches ont été temporairement arrêtées.

2.14 Calendrier

Dans les faits, le Comité Opérationnel a réparti les enquêtes approfondies dans tous les pays membres DIRR sur trois années, en veillant à équilibrer la charge de travail des centres coordonnateurs.

Nous donnons à titre d'exemple les calendriers établis pour la période 1974/1976, avec certains aménagements pour répondre aux possibilités pratiques des pays membres.

	1974	1975	1976
Allemagne	X		
Autriche			X
Belgique		X	
Canada	X		
Danemark	X		
Espagne			X
France			X
Irlande	X		
Japon	X		
Norvège			X
Pays-Bas		X	
Portugal		X	
Royaume-Uni		X	
Suede			X
Suisse		X	

Le même cycle se reproduisant, en principe, ensuite par période triennale.

2.2 Traitement des "fiches-recherche"

Les informations recueillies au cours de l'enquête permettent à chaque membre DIRR de préparer les "fiches-recherche" et de les transmettre au Centre Coordonnateur approprié, lorsqu'il s'agit de "fiches-recherche" correspondant au domaine DIRR:

- Laboratoire Central des Ponts et Chaussées /LCPC/ à Paris pour les "fiches-recherche" en français,

- Transport and Road Research Laboratory /TRRL/ à Crowthorne pour les "fiches-recherche" en anglais,
- Bundesanstalt für Strassenwesen /BaST/ /en collaboration avec Forschungsgesellschaft für das Strassenwesen/ /Fg/ à Cologne pour les "fiches-recherche" en allemand.

NOTA: de 1965 à 1971, la DIRR a fonctionné en procédures manuelles. En 1972, le traitement des données et les échanges entre les trois centres coordonnateurs ont été informatisés /bandes magnétiques/. Dans le cas des "fiches-recherche", le système a fonctionné en informatique pour les nouveaux projets à partir de 1972, le système manuel, réservé aux mises à jour, s'éteignant progressivement. Depuis le 1er janvier 1975, tout le système est informatisé.

2.3 Quelques éléments statistiques

Pour donner une image de l'ordre de grandeur du travail accompli, des progrès réalisés et de l'état actuel du système, il me paraît nécessaire de fournir quelques éléments chiffrés.

Evolution du nombre de pays concernés et du nombre de fiches /non compris les USA/.

ANNEES	Nbre pays	Nbre "fiches recherche"
1964 /première enquête pilote/	4	300
1965-66-67 /première enquête triennale/	36	3500
1968	40	
1969	54	
1970	59	
1971	63	
1972	69	
1973	71	
1974	72	4658

ANNEE 1974 /non compris les USA/

	Nouveaux projets	Mises à jour	Total
DIRR /15 pays/	2200	571	2771
IRF /57 pays/	1436	451	1887
			4658

ANNEE 1974 /y compris les USA/

DIRR /15 pays/	2771
IRF /57 pays/	1887
USA /HRIS/	3380
	8038

Pour l'année 1975, nous sommes à même d'apporter des éléments concernant uniquement les résultats d'enquêtes effectuées dans les pays DIRR.

a/ Pour les pays pour lesquels 1975 était l'année d'enquête détaillée

	Nouveaux projets	Mises a jour
Belgique	14	140
Pays-Bas	55	112
Portugal	12	30
Royaume-Uni	537	233
Suisse	46	79
	664	594

b/ Pour les autres pays:

	Nouveaux projets
Allemagne	88
Autriche	51
Danemark	4
France	141
Irlande	10
Norvège	26
Espagne	47
Suède	88

TOTAL GENERAL 1713

3. Utilisation des informations recueillies

Comme pour tout système documentaire, la description n'en serait pas complète si l'on ne tentait pas de mettre en évidence quelques critères d'utilisation effective des informations recueillies.

Mais le problemes est beaucoup plus difficile à appréhender:

a/ Par le fait que contrairement au système de recueil des informations qui est structuré sur le plan international, l'utilisation des informations recueillies est du ressort strict de chaque organisme concerné. Je ne peux donc en ce domaine que fournir quelques indications sur la situation au LCPC, sans pouvoir prétendre à une quelconque généralisation.

b/ Parce que les informations concernant les recherches en cours faisant l'objet de "fiches-recherche" sont en général livrées aux utilisateurs, non pas de façon spécifique mais, soit dans le cadre de "recherches rétrospectives", soit dans le cadre de la "diffusion sélective de l'information", conjointement avec les informations concernant les publications /fiches-documents/ et celles concernant les programmes de calcul.

c/ Parce que les demandes d'informations complémentaires, les contacts personnels entre chercheurs, qui sont la suite logique des "fiches-recherche" restent généralement le fait d'initiatives individuelles.

Toute tentative d'organisation trop stricte de ces échanges personnels, nous paraît de nature à stériliser les initiatives; devant ces écueils manifestes, nous avons préféré, en ce qui nous concerne, laisser toute liberté aux responsables de recherche.

Malgré ces difficultés, il nous paraît possible de citer les éléments suivants:

- tout d'abord l'existence même de la procédure d'enquête pour recensement des recherches en cours a amené une évolution sensible des méthodes de programmation de la recherche en usage dans les organismes concernés. Alors que lors des premières enquêtes de 1966, on se trouvait généralement en face de "déclarations d'intention", rarement assorties d'indication de délais et de couts, les "fiches-recherche" que nous traitons actuellement au LCPC en tant que membre coordonnateur de langue française, sont manifestement beaucoup plus complètes; le thème de recherche y est généralement décrit de façon précise, des délais et des coûts y figurent. Il en est de même pour celles que nous recevons en tant qu'abonné DIRR.

Il serait sans doute exagéré de prétendre que le système international d'échanges d'informations sur les recherches en cours a été le seul élément entrainant cette évolution, mais il nous paraît indéniable que ce fut l'un des éléments et non l'un des moindres.

Les difficultés rencontrées en 1966 pour mener à bien la première enquête n'ont pu qu'entrainer une certaine prise de conscience de la nécessité d'assurer de façon plus sérieuse la programmation de la recherche. En ce qui nous concerne au LCPC, ce n'est certainement pas une coincidence si les débuts effectifs du système de programmation utilisé actuellement datent de 1968.

Ensuite, il est probable qu'il y a une interaction entre le système d'échanges d'informations sur les recherches en cours et les systèmes classiques de documentation.

Le fait de mentionner les rapports publiés, ou en cours de publication dans les "fiches-recherche", ainsi que l'obligation d'accéssibilité aux résultats qui est une condition formelle /encore qu'elle ne soit pas toujours et complètement respectée/, entraine la mise au jour de toute une littérature "souterraine" /rapports internes/ qui pouvait ne pas avoir été détectée par le système classique et se révèle souvent très fructueuse pour les chercheurs.

Nous avons vu que les deux stades ont été discriminés: "recherche terminée" /il n'y a pas encore de rapport disponible/, puis "terminée" /le ou les rapports sont disponibles/. Pour les rapports qui auraient été publiés, et auraient donc de toute façon été accessibles par les système d'échanges d'informations sur les recherches en cours raccourcit nettement les délais de mise à disposition et augmente considérablement la probabilité d'exhaustivité.

Nous pouvons citer à ce sujet les "rapports de recherche" du LCPC.

Ces rapports de recherche, sitôt publication, sont diffusés automatiquement, grâce:

- à une liste de diffusion systématique /comprenant tous les organismes de recherche travaillant sensiblement sur les mêmes domaines de recherche/,
- à une liste de diffusion spécifique à chaque rapport de recherche établie par les auteurs, en tenant compte de leurs contacts personnels /dont on peut estimer qu'une certaine partie ont été initiés grâce à l'existence de "fiches recherche"/, et d'une utilisation aussi systématique que possible des fiches de recherche "en cours".

La mise en place d'un système interne de documentation correctement informatisé et automatisé, fonctionnant tant en "recherche rétrospective" qu'en "diffusion sélective de l'information", devant nous permettre de résoudre les difficultés nées de l'augmentation très sensible des quantités à traiter, doit d'ailleurs nous permettre de valoriser encore mieux qu'aujourd'hui le système international d'échanges d'informations sur les recherches en cours.

En guise de conclusion, je voudrais souligner:

- premièrement, que ce système - né il y a dix ans - a pu être élaboré, grâce à la conjonction de beaucoup de bonnes volontés et d'un travail opiniatre, pour éliminer, méthodiquement, toutes les difficultés qui se sont présentées - et elles furent nombreuses!
- deuxièmement, que ce système est largement ouvert. Si la DIRR a fonctionné jusqu'en 1972 uniquement entre pays membres, elle déborde maintenant largement le cadre de l'OCDE.

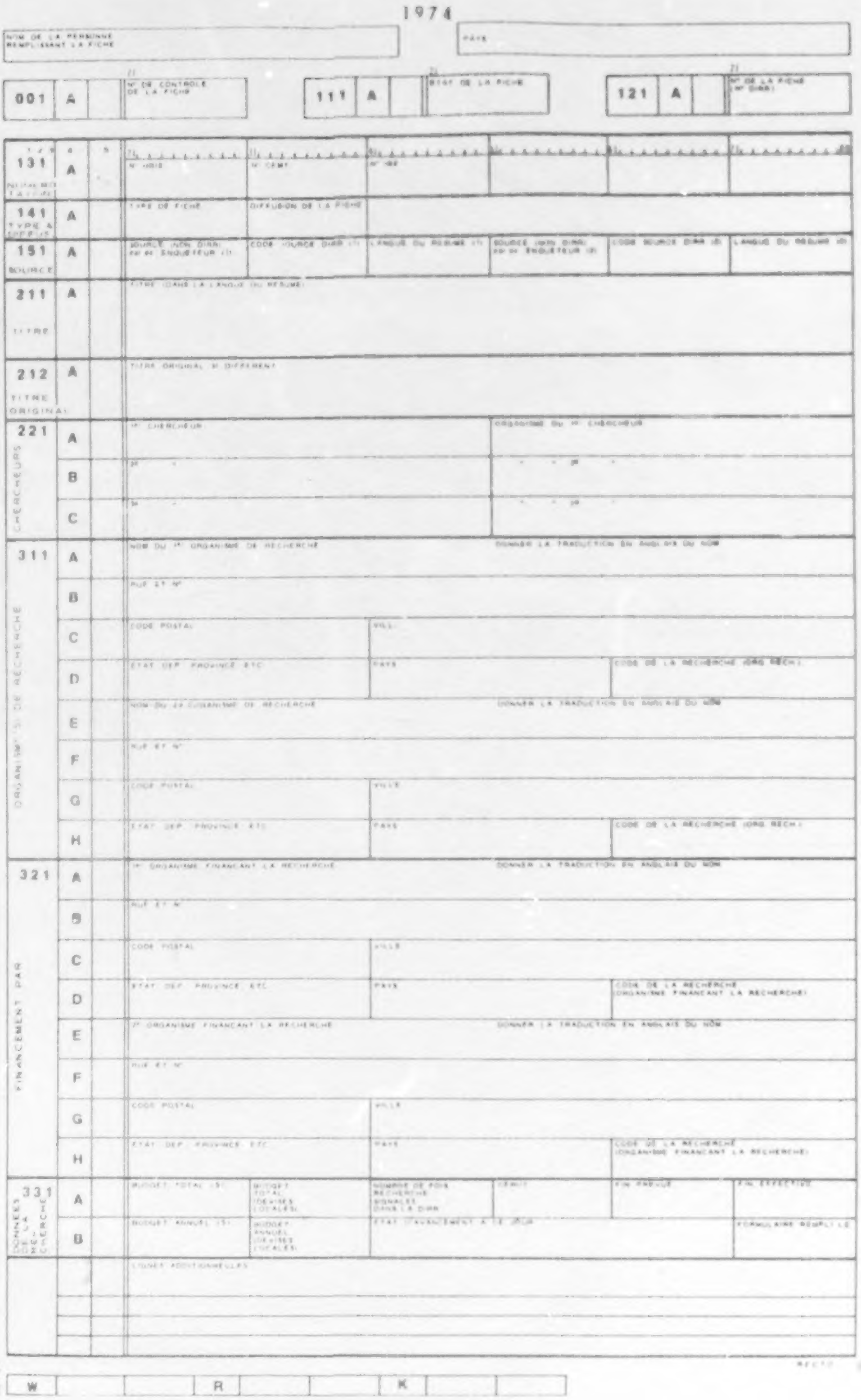
  A l'heure actuelle 51 organismes sont abonnées à la DIRR:

  - 18 dans les pays membres DIRR,
  - 6 dans les pays membres de l'OCDE, non membres DIRR,
  - 27 dans des pays n'appartenant pas à l'OCDE /dont une dizaine en version espagnole/;
- troisièmement, que ce système complexe mais très structuré est encore en voie de développement.

Beaucoup de difficultés restent encore à résoudre, beaucoup d'améliorations peuvent encore être apportées.

DIRR – IDS – IRRD

FORMULAIRE D'ENQUÊTE SUR LES RECHERCHES EN COURS
Fiche utilisée en commun par l'OCDE et l'IRF



1974

NOM DE LA PERSONNE REMPLISSANT LA FICHE | PAYS

001 A — N° DE CONTROLE DE LA FICHE

111 A — ETAT DE LA FICHE

121 A — N° DE LA FICHE (N° DIRR)

131 NUMERO TAXINO	A	N° IRRD	N° CEMT	N° IDS
141 TYPE & DIFFUS.	A	TYPE DE FICHE	DIFFUSION DE LA FICHE	
151 SOURCE	A	SOURCE (NON DIRR) ou ENQUETEUR (1) CODE SOURCE DIRR (1) LANGUE DU RESUME (1)	SOURCE (NON DIRR) ou ENQUETEUR (2) CODE SOURCE DIRR (2) LANGUE DU RESUME (2)	
211 TITRE	A	TITRE (DANS LA LANGUE DU RESUME)		
212 TITRE ORIGINAL	A	TITRE ORIGINAL SI DIFFERENT		
221 CHERCHEURS	A	1er CHERCHEUR	ORGANISME DU 1er CHERCHEUR	
	B	2e	2e	
	C	3e	3e	
311 ORGANISME(S) DE RECHERCHE	A	NOM DU 1er ORGANISME DE RECHERCHE	DONNER LA TRADUCTION EN ANGLAIS DU NOM	
	B	RUE ET N°		
	C	CODE POSTAL	VILLE	
	D	ETAT, DEP., PROVINCE, ETC.	PAYS	CODE DE LA RECHERCHE (ORG. RECH.)
	E	NOM DU 2e ORGANISME DE RECHERCHE	DONNER LA TRADUCTION EN ANGLAIS DU NOM	
	F	RUE ET N°		
	G	CODE POSTAL	VILLE	
	H	ETAT, DEP., PROVINCE, ETC.	PAYS	CODE DE LA RECHERCHE (ORG. RECH.)
321 FINANCEMENT PAR	A	1er ORGANISME FINANCANT LA RECHERCHE	DONNER LA TRADUCTION EN ANGLAIS DU NOM	
	B	RUE ET N°		
	C	CODE POSTAL	VILLE	
	D	ETAT, DEP., PROVINCE, ETC.	PAYS	CODE DE LA RECHERCHE (ORGANISME FINANCANT LA RECHERCHE)
	E	2e ORGANISME FINANCANT LA RECHERCHE	DONNER LA TRADUCTION EN ANGLAIS DU NOM	
	F	RUE ET N°		
	G	CODE POSTAL	VILLE	
	H	ETAT, DEP., PROVINCE, ETC.	PAYS	CODE DE LA RECHERCHE (ORGANISME FINANCANT LA RECHERCHE)
331 DONNEES DE LA RECHERCHE	A	BUDGET TOTAL ($) BUDGET TOTAL (DEVISES LOCALES)	NOMBRE DE FOIS RECHERCHE SIGNALEE DANS LA DIRR DEBUT	FIN PREVUE FIN EFFECTIVE
	B	BUDGET ANNUEL ($) BUDGET ANNUEL (DEVISES LOCALES)	ETAT D'AVANCEMENT A CE JOUR	FORMULAIRE REMPLI LE
		LIGNES ADDITIONNELLES		

RECTO

W			R			K		

1 2 3	4	5	80		
511 RESUME DE LA RECHERCHE BUTS, METHODES ET RESULTATS	A		RESUME DE LA RECHERCHE		
611 DOMAINES DIRR	A		DOMAINES		CODE
	B				
	C				
621 MOTS CLES	A		MOTS CLES		CODE
	B				
	C				
	D				
	E				
	F				
	G				
	H				
	I				
	J				
711 RAPPORTS PUBLIES OU EN COURS DE PUBLICATION	A		TITRE (1)		
	B		AUTEUR	DONNEES DE LA CITATION	DATE DE LA CITATION
	C		DETAILS BIBLIOGRAPHIQUES (REVUE OU EDITEUR OU ORIGINE SI PAS PUBLIE)		N° DIRR
	D		TITRE (2)		
	E		AUTEUR	DONNEES DE LA CITATION	DATE DE LA CITATION
	F		DETAILS BIBLIOGRAPHIQUES (REVUE OU EDITEUR OU ORIGINE SI PAS PUBLIE)		N° DIRR
			LIGNES ADDITIONNELLES		

MISE A JOUR DES DONNEES	DATE	ETAT D'AVANCEMENT A CE JOUR	RECHERCHE SIGNALEE NOMBRE DE FOIS	DATE	ETAT D'AVANCEMENT A CE JOUR	RECHERCHE SIGNALEE NOMBRE DE FOIS

VERSO

* Si revue scientifique, indiquer le volume, le numéro, la première et la dernière page.
Si rapport, indiquer le type de rapport (par ex.: thèse, rapport intérimaire) et le nombre de pages.

IDS – BORDEREAU D'ENTRÉE DIRR – IRRD

1974

001	A		Nº DE CONTROLE DE LA FICHE
111	A		ETAT DE LA FICHE
121	A		Nº DE LA FICHE (Nº DIRR)

NUMEROTATION	131	A	Nº IRRD	Nº CEMT					
TYPE & DIFFUS. FICHE	141	A	TYPE DE FICHE	DIFFUSION DE LA FICHE					
SOURCE	151	A	SOURCE DE LA FICHE (1)	CODE (1)	LANGUE (SOURCE 1)	SOURCE DE LA FICHE (2)	CODE (2)	LANGUE (SOURCE 2)	
TITRE	211	A	TITRE (DANS LA LANGUE DU RESUME)						
TITRE ORIGINAL	212	A	TITRE ORIGINAL						
TITRE AMELIORE	213	A	TITRE AMELIORE						
AUTEUR	221	A	1ᵉʳ AUTEUR	ORGANISME DU 1ᵉʳ AUTEUR					
		B	2ᵉ	2ᵉ					
		C	3ᵉ	3ᵉ					
		D	4ᵉ	4ᵉ					
COLLECTIVITE AUTEUR	223	A	1ʳᵉ COLLECTIVITE AUTEUR						
		B	2ᵉ						
PUBLICATION	411	A	NOM DE LA PUBLICATION						
		B	1ᵉʳ EDITEUR						
		C	RUE ET Nº						
		D	CODE POSTAL	VILLE					
		E	ETAT, DEP., PROVINCE, ETC.	PAYS	PRIX (EDITEUR)				
		F	ISSN	ISBN					
DOCUMENT	421	A	TYPE DE PUBLICATION	DATE	VOLUME	NUMERO			
		B	PAGINATION	LANGUE DU DOCUMENT					
		C	NOMBRE DE PHOTOS	NOMBRE DE FIGURES	NOMBRE DE TABLEAUX	NOMBRE DE REFERENCES	NIVEAU BIBLIOGR.		
		D	RESUMES ANALYTIQUES DANS D'AUTRES LANGUES						
DISPONIBILITE	431	A	CENTRE DE DOCUMENTATION (1)	CODE CENTRE DOCUMENTATION (1)	COTE DU DOCUMENT (1)				
		B	1ʳᵉ FORME AU CENTRE (1)	DISPONIBILITE 1ʳᵉ FORME AU CENTRE (1)	2ᵉ FORME AU CENTRE (1)	DISPONIBILITE 2ᵉ FORME AU CENTRE (1)	3ᵉ FORME AU CENTRE (1)	DISPONIBILITE 3ᵉ FORME AU CENTRE (1)	
			DONNEES ADDITIONNELLES 31	41	51	61	71	80	

W			R			K			

	1 2 3	4	5	21 … 31 … 41 … 51 … 61 … 71 … 80	
RESUME	511	A		RESUME	
CLASSIFICATION (PAR DOMAINES)	611	A		DOMAINES	CODE
		B			
		C			
MOTS-CLES	621	A		MOTS-CLES	CODE
		B			
		C			
		D			
		E			
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		G			
		H			
		I			
		J			
		K			
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		M			
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TERMES ADDITIONNELS	622	A		TERMES ADDITIONNELS	CODE
		B			
		C			
		D			
				LIGNES ADDITIONNELLES 31 … 41 … 51 … 61 … 71 … 80	

DIRR - BORDEREAU D'ENTRÉE PROGRAMME DE CALCUL AUTOMATIQUE - IRRD

1975

001	A		Nº DE CONTRÔLE DE LA FICHE
111	A		ÉTAT DE LA FICHE
121	A		Nº DE LA FICHE (Nº DIRR)

	1 2 3	4	5	21	31	41	51	61 / 71 / 80
NUMÉROTATION	131	A		Nº IRRD				
TYPE & DIFFUS. (FICHE)	141	A		TYPE DE FICHE	DIFFUSION DE LA FICHE			
SOURCE	151	A		SOURCE DE LA FICHE (1)	CODE (1)	LANGUE (SOURCE 1)	SOURCE DE LA FICHE (2)	CODE (2) LANGUE (SOURCE 2)
TITRE	211	A		TITRE				
AUTEUR DE L'ALGORITHME	221	A		1er AUTEUR		ORGANISME DU 1er AUTEUR		
		B		2e		" " 2e		
		C		3e		" " 3e		
		D		4e		" " 4e		
PROGRAMMEUR	222	A		1er PROGRAMMEUR		ORGANISME DU 1er PROGRAMMEUR		
		B		2e		" " 2e		
		C		3e		" " 3e		
		D		4e		" " 4e		
PUBLICATION	411	A		NOM DE LA PUBLICATION				
		B		ORGANISME FOURNISSANT LA DOCUMENTATION				
		C		RUE ET Nº				
		D		CODE POSTAL	VILLE			
		E		ÉTAT, DÉP., PROVINCE, ETC	PAYS	PRIX		
		F		ISSN	ISBN			
DOCUMENT	421	A		TYPE DE PUBLICATION	DATE			
		B		PAGINATION	LANGUE DU DOCUMENT			
		D		DONNÉES DE TEST	ORGANIGRAMME	LISTE SOURCE	DESCRIPTION DU FICHIER	
		E		DESCRIPTION DU PROGRAMME EN D'AUTRES LANGUES				
DISPONIBILITÉ DE LA DOCUMENTATION	431	A		CENTRE (1)	CODE CENTRE DOCUMENTATION (1)	CÔTE DU DOCUMENT (1)		
		B		1re FORME AU CENTRE (1)	DISPONIBILITÉ 1re FORME AU CENTRE (1)	2e FORME AU CENTRE (1)	DISPONIBILITÉ 2e FORME AU CENTRE (1)	3e FORME AU CENTRE (1) DISPONIBILITÉ 3e FORME AU CENTRE (1)
DONNÉES DU PROGRAMME	461	A		LANGAGE(S) DU PROGRAMME	ORDINATEUR			
		B		MONITEUR	TAILLE DU PROGRAMME			
		C		NATURE DU PROGRAMME	UTILITAIRES	DATE DE MISE EN SERVICE		
		D		PÉRIPHÉRIQUES D'ENTRÉE				
		E		PÉRIPHÉRIQUES DE SORTIE				
		F		AUTRES PÉRIPHÉRIQUES				
DISPONIBILITÉ DU PROGRAMME	471	A		RESPONSABLE DE LA MAINTENANCE				
		B		NOM DU CENTRE	CODE AU CENTRE			
		C		RUE ET Nº				
		D		CODE POSTAL	VILLE			
		E		ÉTAT, DÉP., PROVINCE, ETC	PAYS	TÉLÉPHONE, TÉLEX, CABLE		
		F		SUPPORT DU PROGRAMME	DISPONIBILITÉ / RESTRICTIONS			
				CLÉS ADDITIONNELLES (3)	(4)	(5)	(6)	(7)
W			R			K		

34450

	1 2 3	4	5	21 31 41 51 61 71 80	
DESCRIPTION DU PROGRAMME	511	A			
CLASSIFICATION PAR DOMAINES	611	A		DOMAINES	CODE
		B			
MOTS-CLES	621	A		MOTS-CLES	CODE
		B			
		C			
		D			
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		F			
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		H			
		I			
		J			
		K			
		L			
		M			
		N			
		O			
		P			
TERMES ADDITIONNELS	622	A		TERMES ADDITIONNELS	CODE
		B			
		C			
		D			
DONNEES DE LA CITATION	711	A		TITRE DE LA PREMIERE CITATION	
		B		AUTEUR | DONNEES DE LA CITATION	DATE DE LA CITATION
		C		DETAILS BIBLIOGRAPHIQUES (REVUE OU EDITEUR OU ORIGINE SI PAS PUBLIE)	N° DIRR
		D		TITRE DE LA DEUXIEME CITATION	
		E		AUTEUR | DONNEES DE LA CITATION	DATE DE LA CITATION
		F		DETAILS BIBLIOGRAPHIQUES (REVUE OU EDITEUR OU ORIGINE SI PAS PUBLIE)	N° DIRR
				LIGNES ADDITIONNELLES 31 41 51 61 71 80	

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Session IV

Part 2

Paper 40

Summary

WAYS OF SOLVING THE COMPATIBILITY PROBLEM IN THE INTERNATIONAL SCIENTIFIC AND TECHNICAL INFORMATION SYSTEM

In the presentation the author describes the main principles of the system constitution, the implementation of which implies intensive exchange of data files between its components - specialized sub-systemes defined by types of documents and branch subsystems. Various series of measures which make this exchange possible are presented, including harmonization of infrastructures, processes, information support, development of a unified applied software package.

Practical examples of achieving compatibility with other international systems such as INIS, ISDS, etc. are given.

Résumé

COMMENT RESOUDRE LES PROBLEMES DE COMPATIBILITE AU SEIN DU SYSTEME INTERNATIONAL D'INFORMATION SCIENTIFIQUE ET TECHNIQUE

L'auteur du document décrit les principaux principes à la base du systeme dont la mise en oeuvre implique de nombreux échanges de fichiers entre les différents éléments des sous-systèmes spécialisés définis par types de documents et par secteur. L'auteur traite des diverses séries de mesures qui ont rendu cet échange possible et notamment l'harmonisation des infrastructures, des procédés de traitement et des supports de l'information et la mise au point d'ensembles unifiés de programmes d'informatique appliquée.

L'auteur donne des exemples concrets sur les moyens de parvenir à la compatibilité avec d'autres systèmes internationaux /INIS, ISDS, etc./.

WAYS OF SOLVING THE COMPATIBILITY PROBLEM IN THE INTERNATIONAL SCIENTIFIC AND TECHNICAL INFORMATION SYSTEM

Ju.N. SOROKIN

The socialist countries - members of the Council for Mutual Economic Assistance - successfully develop cooperation in all sectors of economy, science and technology. The steady growth of the national income and permanent increasing of the working peoples welfare convincingly proves it. The further development and improvement of the cooperation depends to a large degree on the acceleration of the contemporary scientific and technical revolution and the usage of its results in practical activities.

Consequently, the considerable increase of science efficiency, which has become the productive force of the modern society, is now one of the main tasks considered in the frames of multilateral cooperation of CMEA member countries.

One of the ways of increasing the labour efficiency of the great army of socialist countries' scientists, which comprises over one-third of the total number of the scientists of the world, is providing the most complete information, making necessary the sufficient and continual approach to all sources of scientific and technical information.

The CMEA member countries' International Scientific and Technical Information System, which is being built in accordance with the above Programme, is aimed at the realisation of this goal.

The International System is based on the national systemes of scientific and technical information, on the international information systems on types of documents /specialized subsystems/, on international information branch systems, and also on the activities of the International Centre for Scientific and Technical Information, which was established in 1969 by CMEA member countries.

The elaboration of the system project and methodical guidance is being carried out by the International Centre.

At present, the following international specialised subsystems have been functioning:

- on open accomplished scientific research works and dissertations;
- on patent information;
- on standardisation and metrology;
- on scientific and technical translations;
- on published documents /International Abstracting Service/;
- on scientific and technical films;
- on industrial catalogues.

A number of branch subsystems have already been built and are now functioning, the thematic range of which coincides with the spheres of CMEA permanent commissions' activity /for example, machine building, chemistry, construction, energetics, agriculture, light industry, etc./. The project envisages that the international specialised information subsystems cover all branches of science and technology and ensure processing and dissemination of documentary information /periodical and continual publications, reports on scientific research works, scientific and technical translations, scientific and technical films, patents, and industrial catalogues/. International information branch subsystems of scientific and technical information are engaged in the analytical processing of the information sources and the providing of all organisations concerned, first of all CMEA branch commissions, with factographic information, which are especially required when important decisions are being made.

One-time processing of the materials in specialised subsystems and multiple use of the results of processing in branch subsystems can considerably reduce expenditures for doubling technological operations; this is one of the principal conditions which the international system is based on.

One-time processing of the material is done on the international division of labour, which is especially profitable for small member countries of the system, as it gives the opportunity for access to all the worlds' scientific and technical flow of literature, but having to process only the data from their own national information sources.

Among many complex questions connected with the setting up and functioning of such a diversified and universal international system, one must note the question of determination of subject limits within a branch system. It is impossible to solve this problem in one way.

In a number of cases the thematic overlapping, i.e. the information of interbranch character, amounts to 25-30% of the total file. This applies, for example, to electrotechnology.

All of the above testifies to the existence of great potential possibilities in the International System for the wide file exchange among its components. However, as it is known within the national frames, and moreover, on the international level, the file exchange, although promising considerable profits for its participants, has not attained a wide scope so far.

This is explained by the still insufficient numbers of national information centres equipped by computers, and by the fact that the complicated problem of compatibility with an international information system has not been resolved.

The CMEA committee on scientific and technical cooperation, under the general guidance of the International System, made it the International Centre's duty to be at the head of the whole scientific and organisational works complex, and to assure the compatibility of its subsystem.

The special decision of the above Committee defined the organisational compatibility of the main elements of the system. It is ensured by that fact that the International System acts and is governed by the organisational, functional, methodical and financial questions which are common to all subsystems, on the basis of the decisions of the leading body of the International Centre - the Committee of the Permanent Representatives. As to the questions reflecting the specific interests of the information users, they are solved on the basis of the regulations and decisions of the permanent commissions and other CMEA bodies.

The organisational compatibility is provided with structure typicalness of the specialised and branch subsystems and also typicalness functions of the bodies included in it - the system council, appointed national,head and base organs.

While being established, the International System passes through are the following different stages:

- approval of the main subsystem regulations;

- subsystem organisation /approval of its organs/;
- the beginning of the functioning;
- application of automation.

The stage approach not only relieves solving organisational compatibility problem, but also promotes the setting up of the system under the conditions of irregular development of the information systems in different countries.

The international specialised and branch subsystems pass through these stages with the active participation of the International Centre. The ICSTI has worked out for every stage corresponding methodical documents, and takes energetic measures for the development of subsystems in strict accordance with the International System project.

Our experience shows as a whole the system project gives a realistic picture of the organisational interaction of its components. However, it cannot claim to be the optimal decision, as its elaboration has been done within a limited period of time. This is the reason that certain difficulties have not been resolved for the connection of the national information systems which are adapted to different structures of economy. Due to this, the information systems of small countries, the profile of which is more complex, have to participate meanwhile in many international subsystems. For example, the structure of such complex international subsystems as machine building, has not been cleared.

This is the reason for the deep analysis of the International System development prospects. Forecasting for the development of the International System till 1990 serves this aim. Methods of mathematic and imitation modelling by computers will enable us to choose the most optimal subsystem structure and to determine proper communicative channels of information file exchange.

Among the general problems of information system compatibility, the language compatibility problem is the most difficult one to solve.

In the International System, where there are many different national languages, the Russian language has been chosen as a working intermediate language. It is supposed to solve the task of language compatibility stipulated by the difference of existing information retrieval languages by the creation of the complex of information retrieval language system which provides:

- rational distribution of information files among subsystems;
- many-aspected retrieval in subsystems;
- compatibility of retrieval language of International System with the information retrieval languages of system member-states.

Stemming out from the above requirements, the complex of the information retrieval language system of two-leveled structure as technological normative documents has been created and approved by the Committee of Permanent Representatives. The complex is based on information retrieval language of the descriptor type and consists of:

- nucleos;
- information retrieval languages of international specialised subsystems;
- information retrieval languages of international branch subsystems.

The nucleos includes the international system rubricator, which at present has been agreed with all countries and will be confirmed as technological normative documents and also macrothesauri of the general technical, scientific and interbranch language vocabulary. The rubricator represents the classification polythematic scheme having three levels of hierarchy and reflecting polyhierarchic connections among headings. It is the main systematic part of macrothesaurus.

The system rubricator is to provide:

- the determination of subject limits of subsystems;
- the accumulation of information files in subsystems for their transfer to other subsystems which are functionally connected with them;
- the systematisation of the information files in the subsystems and preparation of the information publications.

The macrothesaurus is to provide:

- the compiling of the information files on the basis of retrieval documents image and requests which are composed with the use of macrothesaurus, for their transfer to connected subsystems and other international systems of the world.

As UDC, ICP and other classifications will be widely used as an information retrieval language of the subsystems, a number of correspondence tables also must be included in the complex information retrieval language system. They are intended for establishing interaction of the international system rubricator with the international classifications used in it.

The elaboration in subsystems of multilingual thesauri on the unified methods, worked out by the International Centre will be the next step in solving the language problem. In a number of branch subsystems, for example, in the international construction subsystem, a multilingual thesaurus, worked out by the specialists from GDR, HPR, USSR and CSSR, has undergone successful experimental checking on computer.

Two main tasks are being solved in the International System for providing technical compatibility:

- providing compatibility of input and output materials of appointed national and base organs of the system and the International Centre;
- providing compatibility of technological processes, methods and technical means which are used in the appointed national and base system organs and the International Centre.

The Perspective Plan on Standardisation, adopted by the Committee of Permanent Representatives, includes twenty-four normative and technological documents and standards. The use of them will considerably speed up the accomplichment of the above tasks by the way of wide application in practice of the unified bearers and ways and structures of recording of information on them.

In its turn, the second group of tasks is divided into two main subgroups:

- compatibility of technological processes of information processing on computers of a single series accepted in CMEA member countries;
- compatibility of methods of transfer of semantic information.

The solution of the first group questions is hampered by the use of the different packages of applied programmes of their own in each country.

To overcome this obstacle in the nearest future, the task is to work out, and then to use the unified package programme for solving information tasks within the International System frames. Following this aim the International Centre has worked out, and its leadership body has approved, the technical assignment for creating a unified package programme. Under the International Centre, the Council of Specialists was organised. Taking into consideration the requirements of the technical assignment the above Council will study the possibilities of the applied packages, probe them and elaborate the proposals for use of the most optimal ones in concrete information subsystems of the International Scientific and Technical Information System. Having in view the gradual transfer to the unified package programme, the Council of Specialists will also coordinate the development of the package programme in the ICSTI member states.

AIDOS programme has been subjected to the first experimental checking. It has been worked out by "Robotron" in GDR, and is used for the international subsystem on open accomplished non-published scientific research works and dissertations.

With much complicated work the International Centre has accumulated an information base on:

- systems of methods for working out the applied programmes;
- algorithms and applied programmes of information processing;
- materials characterising the results of these algorithms and programmes use in the world experience.

The building of the International System demands the prompt equipment of the national information organs, and their participants with computers and duplicating machines. Since it is expected the wide use of computers of single series, the International Centre /with the active participation, highly-qualified specialists from the International Centre member countries/ has worked out "The Communicative format of data recording on magnetic tape for the third generation computers", which is of great importance for successful functioning of the International System.

This document including ISO recommendations is a further step forward in resolution of the compatibility problem, and it is accepted by the leading International Centre organ as a normative technological document which is compulsory for all international information subsystems.

The decision of financial questions connected with the information service payment may be referred in a certain sense to the compatibility problem. The International Centre member countries established unified prices for the information services granted to them. Now the second step is being taken, the agreement on and confirmation of unified prices for all system members. One type of calculation of prices will create more favourable conditions for the information exchange among all partners concerned.

The above mentioned international subsystem on open accomplished scientific research works and dissertations /the head information body of which is the International Centre/, is the wide experimental field for solving the complex compatibility problem. The subsystem, which has been functioning since 1973, gave to its participants access to valuable information sources in all branches of science and technology. The information about the information sources is being published in eleven series of the abstracting journal.

The subsystem is of great interest not only from the information point of view but also that of management. The volume of materials is being expanded gradually. Package programme information which is used during scientific and engineering works has started to be input along with the information on scientific research works and dissertations.

Gradually, the entire complex of non-published, hardly accessible documents will find its way to the abstracting journals' pages.

The subsystem will serve as a sufficient information base for strengthening the coordinating role of CMEA in the field of scientific and technical socialist countries' cooperation and the more effective use of their scientific potential when it includes the maximum volume of scientific research works carried out in the subsystem member countries.

As mentioned above, the subsystem on scientific research works has been functioning with the application of the traditional information processing means since 1973.

On this stage the compatibility questions are being solved with the help of:

- the unified working language /Russian/;
- the unified methods of information input /format, bibliographic description, abstract/;
- the unified rubricator and UDC.

In 1976 the subsystem will start to work automatically with ECM R-1040 and mathematical AIDOS provision.

In this case the compatibility problem will be solved with the help of:

- the unified working language /Russian/;
- the communicative format /for the exchange of information, recorded on magnetic tapes/;
- the rubricator and subsystem thesaurus, accordingly connected with the rubricator and macrothesaurus of the International System as a whole.

Computerisation is supposed to speed the elaboration of multilingual subsystem thesaurus. This will enable us to realise the retrieval and publication of descriptors to abstracts and registers of abstracting journals in the subsystem member country languages.

There are still many scientific and organisational obstacles in the way of establishing the International Scientific and Technical Information System. However, they will be successfully overcome with the joint efforts of the socialist countries' information specialists.

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Session IV

Part 2

Paper 41

Summary

INVENTORY OF ONGOING RESEARCH IN THE FIELD OF OCCUPATIONAL RISKS: THE INTERNATIONAL DIRECTORY OF RESEARCH LABORATORIES AND ORGANISATIONS

The prevention of industrial accidents and diseases is directly related to the expansion, in all countries, of the resources directed to scientific and industrial research.

For this reason, the International Social Security Association in 1970 formed the International Committee for Research into the Prevention of Occupational Risks, whose task is to ascertain the ongoing research or projected research in the different countries and to pass this information on to the prevention organisations concerned.

To carry out this task, the National Research and Safety Institute, which provides the Committee's Secretariat, makes a periodical and systematic census of research organisations and research topics and publishes the information collected.

The subject of this paper is the way this information system is planned, the sources used, and the presentation and circulation of the Directory. Some examples of the usefulness of this Directory will be given.

Résumé

INVENTAIRE DES RECHERCHES EN COURS DANS LE DOMAINE DE LA PREVENTION DES RISQUES PROFESSIONNELS: LE REPERTOIRE INTERNATIONAL DES LABORATOIRES ET ORGANISMES DE RECHERCHE

La prévention des accidents du travail et des maladies professionnelles est directement liée au développement dans tous les pays des moyens consacrés à la recherche scientifique et industrielle.

C'est pourquoi l'Association internationale de la sécurité sociale a créé en 1970 le "Comité international pour la recherche dans le domaine de la prévention des risques professionnels" dont la mission est de connaître les recherches en cours ou les projets de recherche dans les différents pays et d'en informer les organismes de prévention intéressés.

Pour remplir cette mission, l'Institut national de recherche et de sécurité - qui assure le secrétariat du Comité - procède périodiquement au recensement systématique des organismes et des thèmes de recherche et publie les renseignements recueillis.

La conception de ce système d'informations, les sources utilisées, la présentation et la diffusion du Répertoire font l'objet de la présente communication, qui donnera également quelques exemples de l'utilité de cet ouvrage.

INVENTAIRE DES RECHERCHES EN COURS DANS LE DOMAINE DE LA PREVENTION DES RISQUES PROFESSIONNELS: LE REPERTOIRE INTERNATIONAL DES LABORATOIRES ET ORGANISMES DE RECHERCHE

M. [illegible]HAN[illegible] - M.G. DEROCHES

1. Origine et objet

Le "Répertoire international des laboratoires et organismes de recherche en hygiène et sécurité du travail" [1], que publie l'Institut national de recherche et de sécurité /INRS/ a pour objet de faire connaître sur le plan international les organismes effectuant des recherches dans le domaine de la prévention des risques professionnels, ainsi que leurs études en cours et en projet.

Cette initiative a été envisagée dès la création, en 1968, du Centre de recherche de l'INRS; il est en effet apparu indispensable que s'établisse un échange d'informations entre les organismes de différents pays engagés dans des travaux de recherche dans le domaine de la prévention. Disposant dès sa création d'importants moyens de recherche scientifique, le Centre de recherche de l'INRS devait naturellement orienter ses activités en fonction notamment des travaux effectués ou prévus par d'autres organismes.

De plus, l'INRS ayant parmi d'autres missions celle de recueillir, élaborer et diffuser la documentation en hygiène et sécurité du travail, il se devait d'apporter à ses correspondants des informations s'appuyant non seulement sur une documentation traditionnelle mais encore sur un état des recherches en cours.

Enfin, l'Association internationale de la sécurité sociale /AISS/ avait décidé de créer un Comité international pour la recherche dans le cadre de sa Commission permanente pour la prévention des risques professionnels. Compte tenu notamment de ses activités pluridisciplinaires et de ses moyens de recherche, l'INRS fut chargé du secrétariat de ce Comité, créé officiellement en 1970.

2. Délimitation du domaine

Le Comité s'est donné pour mission de connaître les recherches en cours et les projets de recherche prévus dans les différents pays et d'en informer les organismes de prévention intéressés.

Il est difficile de fixer des limites à la notion de "recherche". Cependant, il a paru souhaitable de définir un certain nombre de critères de choix et d'écarter certaines activités /études statistiques, enquêtes, relevés de routine, essais effectués en application d'une réglementation/ qui, bien que nécessaires à la recherche, n'en font pas partie. Seules ont été retenues les activités comportant une expérimentation et apportant un élément d'innovation intéressant la collectivité.

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[1] "La recherche en hygiène et sécurité du travail - Répertoire international des laboratoires et organismes de recherche". 2ème édition 1974, 584 pages. En français et en anglais.

Pour remplir sa mission et promouvoir les échanges d'information, le Comité pour la recherche publie régulièrement le Répertoire des laboratoires et organismes de recherche en hygiène et sécurité du travail.

Les informations figurant dans le répertoire ne font pas double emploi avec celles figurant dans les répertoires publiées par d'autres organismes internationaux; au contraire, ces répertoires se complètent mutuellement:ainsi, BIT/2/ recense tous les organismes de prévention,que leur activité principale soit ou non la recherche, et signale leurs activités et leurs domaines d'études. sans toutefois préciser quelles sont les études en cours et en projet. Le CIS [2] quant à lui, fournit des services de bibliographie et de recherche de l'information dans le domaine de la sécurité du travail; ainsi son activité porte-t-elle essentiellement sur la publication de travaux originaux.

3. Les sources d'information

L'activité du Comité s'insérant, comme nous venons de le voir, dans le cadre d'activités internationales plus générales, l'une des sources d'information du Comité pour le recensement des organismes de recherche a été les organismes internationaux et, à travers eux, leurs correspondants dans chacun des pays membres; ainsi, par exemple, la collaboration des différents centres nationaux du CIS a-t-elle été demandée. Les différents comités de l'AISS exerçant leur activité dans des secteurs spécifiques ont également été consultés.

Dans chacun des pays concernés, des contacts ont été pris avec les services spécialisés des ambassades, les ministères responsables des questions de prévention et, bien entendu, les organismes centraux d'organisation de la recherche. Nos correspondants et notamment les organismes homologues de l'INRS, ont également été consultés.

Toutefois, la principale source d'information du Comité a été le dépouillement des publications /publications périodiques spécialisées, répertoires et annuaires, rapports techniques, programmes et compte-rendus d'activités, etc./.

4. L'enquête

Les renseignements figurant dans le répertoire ont été recueillis à la suite d'une enquête réalisée en 1973 par voie de questionnaires envoyés directement par le Comité aux organismes susceptibles d'effectuer des recherches dans le domaine de la prévention des risques professionnels.

Contrairement à ce qui se fait parfois, le Comité n'a pas effectué son enquête par l'intermédiaire de correspondants dans chacun des pays, ce en raison du domaine traité et de la nature des organismes effectuant des recherches en hygiène et sécurité du travail. En effet, ces organismes sont de deux types, à savoir:

- les organismes dont la recherche en matière de prévention est l'activité principale et, parmi eux:
  - ceux dont la compétence s'exerce dans des secteurs d'activité précis,
  - ceux dont la compétence s'exerce dans plusiers secteurs d'activité;
- les organismes à vocation scientifique ou technique dont la recherche en matière de prévention est une activité occasionnelle.

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[2] BIT : Bureau international du travail

CIS : Centre international d'informations de sécurité et d'hygiène du travail. L'INRS est le centre national du CIS pour la France.

C'est donc en raison de ce caractère spécifique des recherches dans le domaine de la prévention que le Comité s'est adressé directement aux organismes qui lui avaient été indiqués et qu'il avait recensés.

Environ 700 organismes répartis dans une soixantaine de pays ont ainsi été touchés par cette enquête.

La tenue des fichiers ainsi que l'exploitation des données fournies dans les réponses aux questionnaires ont été faites manuellement. En effet, compte tenu du nombre relativement faible d'organismes touchés et du caractère particulier de l'enquête, le recours à des moyens automatiques de traitement de l'information ne s'imposait pas.

Plus de 450 organismes répartis dans une cinquantaine de pays ont répondu à cette enquête et nous ont, pour la plupart, fourni des informations très détaillées sur leurs activités. En raison de la nature et de l'originalité des recherches qu'ils conduisent, de l'importance des moyens qu'ils mettent en oeuvre, de l'intérêt que revêt la présentation de leurs activités, 230 organismes répartis dans 35 pays ont été retenus par le Comité pour figurer dans ce répertoire.

5. Présentation du répertoire

Le répertoire, qui se présente sous forme d'un volume broché 21 x 29,7 cm de 580 pages, a été conçu comme un outil de travail pour les chercheurs scientifiques. Ainsi, sa consultation est facilitée par des différents tableaux et index suivants: tableaux permettant d'identifier les organismes, par pays, en fonction de leurs secteurs d'activité et de leurs domaines d'études; index analytique des thèmes de recherche, des études en cours et des projets d'études; index alphabétique des personnes citées /responsables et cadres scientifiques/ et enfin un index géographique permettant d'identifier les organismes par pays et par villes.

Chacun des 230 organismes recensés fait l'objet d'une notice descriptive détaillée.

Chaque notice comporte, outre le nom de l'organisme dans la langue originale, sa traduction en français ou en anglais, l'adresse et le numéro de téléphone, les rubriques suivantes:

forme juridique, année de création, mission, noms des responsables et des cadres scientifiques, effectif total, effectif des chercheurs, principaux secteurs d'activité, domaines d'études, thèmes de recherche à long terme, études en cours, projets d'études, équipements remarquables, publications.

Une place particulière est accordée aux rubriques consacrées à la mission de l'organisme, à ses thèmes de recherche et à ses études en cours et en projet.

6. Utilisation du répertoire

Ainsi, en consultant le répertoire on peut très rapidement connaître les organismes exerçant une activité dans un domaine déterminé et avoir des informations sur leurs études en cours et sur leurs projets d'études.

Pour faciliter la consultation du répertoire, les études et recherches ont été signalées uniquement par leurs titres. Dans la plupart des cas le Comité est en mesure d'apporter à toute personne intéressées un complément d'information sur la base des renseignements fournis par les organismes. Plus fréquemment, les responsables de recherches intéressés par les thèmes d'études cités dans le répertoire se mettront directement en rapport avec l'organisme concerné.

Parmi les services qu'on peut attendre du répertoire, signalons à titre d'exemple l'aide qu'il apporte lors de l'élaboration des programmes de recherche.

Ainsi, dans le cas de l'INRS, les informations mises à sa disposition pour remplir sa mission de prévention sont multiformes. Au fil des années, l'INRS s'efforce de dégager - à partir des éléments ainsi recueillis - des thèmes généraux d'étude tenant compte à la fois des priorités et des chances sérieuses d'aboutir à des solutions concrètes. Chacun des thèmes retenus fait ensuite l'objet d'une réflexion analytique afin de découvrir tous les sujets d'études à entreprendre pour résoudre le problème posé.

Ensuite, prallèlement aux études bibliographiques, des enquêtes sont menées pour savoir qu'elles sont les études et recherches en cours tant en France qu'à l'étranger. Le répertoire a ainsi permis à l'INRS d'entrer en relation avec des organismes étudiant certains des phénomènes recensés, ce qui a permis d'éviter des doubles emplois et, dans certains cas, de parvenir à une collaboration au plan international.

Après ces enquêtes préliminaires, quelques unes seulement des nombreuses études recensées ont été inscrites au programme d'activité de l'INRS et entreprises à moyen ou à long terme. Leurs résultats ont été, ou seront communiqués aux autres organismes engagés dans des études sur le même thème.

Conclusion

Comme nous venons de le voir, le Répertoire international des laboratoires et organismes de recherche, conçu comme un outil de travail pratique pour toutes les personnes participant à la prévention des accidents du travail et des maladies professionnelles, ouvre la voie à une véritable coopération entre les laboratoires de recherche, tant au plan national qu'au plan international.

En effet, la coordination des recherches qui est un des objectifs du Comité ne pourra s'établir que lorsque les organismes des divers pays se connaîtront mieux. Les spécialistes de l'information dans les différentes disciplines représentées à ce colloque, peuvent jouer un rôle non négligeable en aidant le Comité pour la recherche à accomplir sa mission pour assurer une meilleure protection de l'homme au travail.

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Summary

THE UNISIST PROGRAMME: A FRAMEWORK FOR INTERNATIONAL INFORMATION EXCHANGE

The paper describes existing trends in international cooperation in the field of scientific and technical information. A new phenomenon in scientific communication is mentioned: the establishment and development of international information programmes and systems as a result of increasing international co-operation in science.

The UNISIST programme and its main efforts towards harmonizing international cooperation and scientific information present:

- actions towards developing national, regional or international scientific information policies;
- actions towards improvement of institutional and normative components of information transfer;
- development of specialized information manpower and training of users;
- assistance to Member States in the creation and development of their information infrastructure.

Some proposals concerning the development of information systems on on-going research within the UNISIST framework are mentioned.

Résumé

LE PROGRAMME UNISIST, CADRE POUR L'ECHANGE INTERNATIONAL D'INFORMATIONS

L'auteur de l'exposé décrit les tendances actuelles dans la coopération internationale dans le domaine de l'information scientifique et technique. Il signale l'apparition d'un phénomène nouveau, à savoir la création et le développement de programmes et de systèmes internationaux d'information suscité par le développement de la coopération scientifique internationale.

Le Programme UNISIST et ses principaux éléments en vue de l'harmonisation de la coopération internationale et de l'information scientifique comporte:

- des activités visant à l'élaboration de politiques de l'information scientifique aux niveaux national, régional et international,
- des activités visant à améliorer les institutions et les normes à la base du transfert de l'information,
- des activités visant à développer les effectifs des spécialistes de l'information et à former les utilisateurs de l'information,

- l'octroi d'une assistance aux Etats Membres pour les aider à créer puis à développer leurs propres infrastructures dans le domaine de l'information.

L'auteur fait état de certaines propositions concernant le développement des systèmes d'information sur la recherche en cours dans le cadre de l'UNISIST.

THE UNISIST PROGRAMME: A FRAMEWORK FOR INTERNATIONAL INFORMATION EXCHANGE

A. WYSOCKI

The needs for international cooperation

The exponential growth of scientific and technical literature that we have been observing for many years, and especially during the last decade, does not permit the individual scientist to follow all information published in his field of interest. If he wishes to know the progress made in his discipline,he is obliged to use the existing information services or systems.

This rapid growth of scientific literature influences and determines the development of institutional components of information transfer and method of its handling. It has been estimated that in 1985 automated systems and networks will be carrying between a quarter and a third of the volume of storage and retrieval of scientific and technical information.

It is also an internationally recognized fact that self-sufficiency in scientific and technical information, even of big industrial countries, cannot be achieved and, therefore, policy-makers and information managers emphasize the necessity of developing international cooperation in order to increase the effectiveness of information services. The need for international cooperation in this field is also indispensable because the development of automated information services needs the compatibility of computerized systems for storing and retrieving of scientific information. This is, of course, a highly complex and multi-faceted problem which cannot be solved at the national level and which requires worldwide international cooperation.

The trend or movement towards increased measures of cooperation also rests upon economic forces. Basically, the increases in volume of information units to be processed is combined with the increase of manpower costs and therefore is driving the managers of information systems to consider the redistribution of tasks and input sharing in order to make the services more economical.

It should also be recognized that information itself is becoming an important political commodity. As issues grow more interrelated, it will be increasingly difficult for nations to have at their disposal the full range of information on which to base their policy decisions. We are therefore at present observing the establishment and development of international information systems which have access to data bases in every cooperating country. In the future it seems also that only these systems will have the unique opportunity of accumulating complete information on a world-scale. If they meet this opportunity effectively, international cooperative information systems will play an essential role in information transfer.

It could be said that, on a world-scale, information policies are changing because of the information interconnections and are turning away from competitive strategies towards cooperative strategies. Cooperation becomes essential to information flow.

The present trends in international cooperation in the field of scientific and technical information

In the present development of information programmes and systems, a clear tendency can be observed that existing services and systems at the national level are seeking agreements in order to establish and develop national information systems according to international guidelines and standards. The systems are more or less rigid depending on the socio-political structure of the country. Such a tendency is shown, for example, in European countries and in other regions where the governments have tried to establish a national network of scientific and technical information. Three criteria - management, access and use - determine the organization of overall national systems in order to make them more efficient both from an economic point of view and user responsiveness of services.

Along the same lines, the second tendency which is apparent is at the regional level where national information systems or services are working towards closer international cooperation and the establishment of regional systems or networks. Such a trend can be observed for example in Western Europe, where the European Communities have launched a three-year plan in order to develop a European information network in science and technology. Sinilar efforts can be seen in the countries of the Council for Mutual Economic Assistance /CMEA/, where an international system for scientific and technical information has been launched, based on discipline-oriented and specialized information services.

There is a third tendency which to some extent is a logical consequence of the two previous tendencies - to create a worldwide framework for international cooperation in the field of scientific and technical information, in order to facilitate the transfer of information between and among existing national and regional systems and services. The third tendency is epitomized by the setting-up of the programme for international cooperation in scientific and technical information /UNISIST/.

UNISIST is a continuing, intergovernmental programme based on a joint UNESCO/ICSU study with the aims: to co-ordinate existing trends towards cooperation and to act as a catalyst for the necessary developments in scientific and technical information and to develop the necessary conditions for systems interconnection and to facilitate access to world information resources. The ultimate goal is the establishment of a flexible and loosely-connected network of information services based on voluntary cooperation. UNISIST has been concerned initially with the basic sciences, applied sciences, engineering and technology but it will be later extended to other fields of knowledge. The extension to the social sciences is currently under way.

While the long-range goal of UNISIST is to develop international networks of national information services in various sectors of human interest, the intermediate broad objectives which have guided specific programmes, including projects and activities:

- actions towards developing national or regional information policies and infrastructures;
- actions towards improvement and strengthening the institutional and normative components of information transfer;
- development of the specialized human resources essential to the planning and operation of future information networks.

UNISIST and National Information Policies and Development of National and Regional Infrastructures

The development of national information policies and information infrastructures is essential for all information activities. It is impossible to propose or even imagine that international cooperation or international information systems could be developed without national involvement. The basic input to all information systems in science and technology and in other fields has its origin at national level. Therefore, the successful implementation of the UNISIST programme depends to a great extent on the active participation of Member States, especially through the work of national focal points and UNISIST National Committees.

Many countries, especially those in regional groups such as NORDOK /Scandinavian countries/, OECD, the CMEA countries and those of the European Communities have recognized the need for such national coordination of information activities; to date, some 50 Member States have established focal points or UNISIST National Committees.

Another action undertaken in the field of information policy has been the publication of UNISIST Proposals for information policy objectives. This checklist of proposed objectives has been designed to provide guidelines to the national focal points in the various aspects of information transfer including for example primary and secondary services and systems, training, research and standardization in the field of information, administrative, legal and financial problems, and aid to developing countries.

The UNISIST efforts in this field are not only restricted to the creation of focal points and the formulation of objectives. UNISIST is also involved in direct assistance, realized either from regular budget or extra budgetary resources.

The purpose of these activities, mainly oriented toward developing countries, are as follows:

- to review national requirements in scientific and technical information;
- to advise on and to assist in the establishment of national or regional scientific and technical information services;
- to conduct the pilot projects with the aim of assessing effective approaches for linking the countries with existing information services.

To assist Member States in their work in the field of scientific and technical information, UNISIST has prepared and published several guidelines. As examples, the following could be mentioned:

1. Guidelines on the Conduct of a National Inventory of Information and Documentation Facilities

2. Guidelines on the Planning of National Scientific and Technological Information Systems

In order to test and gain experience in new information approaches in developing regions, four regional projects were initiated in 1974 and are being continued in 1975.

Apart from pilot projects, the UNISIST programme foresees advisory services in order to encourage regional development of scientific information policy and structures. As an example, a first meeting of South Asian experts on information policies was convened in December 1974 in Colombo, Sri Lanka. This meeting established a set of criteria for planning information activities at the national and regional level and formulated proposals for the promotion of regional cooperation in information policy development.

Furthermore, UNISIST provides short term advisory services and assistance for the formulation of national plans for scientific and technological information systems. In 1975 for example, six such missions were undertaken for African countries, and four in the Arab States region.

Normative activities - Systems compatibility

One of the UNISIST priorities recommended by the UNISIST Steering Committee and approved by the UNESCO General Conference is the improvement of tools for systems interconnection. In this field, UNESCO is cooperating very closely with ISO and professional groups. The results, some of which I would like to review with you at this time, are being presented in the form of guidelines and recommendations.

Many UNISIST normative activities are designed to meet the requirements of information systems and services. For example, the Reference Manual for Machine Readable Bibliographic Descriptions provides secondary information services with an agreed minimum set of data elements for bibliographic data records. The Guidelines for the Establishment and Development of a/ Monolingual and b/ Multilingual thesauri are meant to facilitate the development of a standardized method for thesaurus construction. UNISIST Indexing Principles are now available in draft form, and Guidelines for the Construction of Flagging and Tagging Schemes and for Intellectual-level Codes in Bibliographic Records are in preparation.

The International Serials Data System /ISDS/ has been organized with the help of UNISIST to carry out work on the identification of serials on an international scale. Jointly with ICSU/AB and ISDS UNISIST has prepared Guidelines for the Coded Bibliographic Strip for serial publication which will facilitate computer based bibliographic control for serials.

All the existing UNISIST guidelines as well as new guidelines needed for information systems will be incorporated into the UNISIST Manual for Information Handling Procedures. This manual will serve to disseminate information about standards, guidelines, and other means of a normative character relevant to systems interconnection. It will also provide appropriate information for the designers of new information systems.

A final aspect of standardization which I would like to mention is the Broad System of Ordering, worked out in collaboration with FID to serve as a switching mechanism among different classification schemes and thesauri.

UNISIST Educational Programm

The UNISIST activities in education and training in the information field form an important part of the programme.

The principle aims of this activity are:

- Coordination of international assistance programmes in training and education;
- Preparation of a basic handbook for information specialists, a manual for the training of users as well as further relevant guidelines and curriculum material;
- Organization of specialized courses for teachers and managers of information systems and or training courses for information specialists.

Within its programme for harmonization of international assistance programmes, UNISIST is functioning as an international focal point for coordination, and is promoting the establishment of a clearinghouse to disseminate information on training programmes in information sciences.

An important aspect of UNISIST training and education activities deals with the publication of handbooks and guidelines. The UNISIST Handbook for Information Systems and Services, to be published in 1976, is designed for information workers and students in developing countries. Emphasis will be placed on systems analysis, design and evaluation, and practical considerations.

The UNISIST Manual for the Education and Training of Users is a guide for teachers and information specialists responsible for organizing courses, seminars and workshops in developing countries. This Manual, providing a methodology for basic courses for university students and training workshops for practitioners, will be tested this year and published in 1976.

Apart from the Handbook and the Manual, several guidelines have already been prepared by UNISIST. Examples are: Guidelines for the organization and also for the evaluation of training courses, workshops and seminars in scientific and technical information and documentation.

I would also like to mention a final aspect of the UNISIST programme in education and training - our active role in the organization of international courses, schools and workshops.

Mr. Chairman, several international operational information systems /e.g. INIS, AGRIS, SPINES, DEVSIS/ are planned or are being developed within the framework of UNISIST principles, standards and guidelines. The participation or even more existence of UNISIST appears to act as a catalytic and harmonizing factor in the evolution of other science and technology based information systems.

Other information services or systems in the sciences, designed to meet specific needs are developed according to and benefiting from the principles of UNISIST. These include, for example WISI /World Information System in Informatics/; ASFIS /Aquatic Sciences and Fisheries Information System/, jointly developed by FAO and the IOC; MEDI /Marine Environmental Data Information/, developed by IOC in collaboration with UNEP and UNESCO.

Concluding remarks

I would like to conclude this short presentation with some reflections concerning the role UNISIST could play in the establishment and development of information systems and services in current research.

The UNISIST Programme, as outlined in the feasibility study and approved by the Intergovernmental Conference and UNESCO General Conference, dealt mainly with published and publishable information.

However, user needs studies, undertaken by several groups, showed the great interest of scientists and engineers in information on ongoing and accomplished research. Therefore, in the formulation of UNISIST information policy objectives, adopted by governmental bodies, special attention was given to the distribution of research and development reports. These information policy objectives recommend the making of arrangments with each government department and agency, as well as each independent research organization, so that R & D reports be made generally available as soon as they can be released. It was recommended further that one central agency should be responsible at national level for documentation storage, loan and sale of these reports.

To meet information policy requirements, several guidelines were developed or initiated within the UNISIST programme. The principal guidelines deal with how to conduct a national inventory of current research and development projects, prepared by Mr. Peretz WOLLMAN. The purpose of these guidelines is to assist in the design and implementation of an appropriate current research information system, to advise how to describe the system rational, to describe the administrative and operational procedures and to recommend forms for the handling of input and output.

These guidelines should help information systems and networks which are providing only part of the information represented by primary and secondary literature and do not cover the national resources and development efforts. This data base of current R & D could provide vital information to science policy makers, R & D managers and the scientific community as a whole.

Within the UNISIST programme, the further following guidelines were also prepared in order to assist in the transfer of R & D projects:

- Guide for the presentation in the primary literature of numerical data derived from experiments. This guide contains general recommendations on the reporting of numerical data for the guidance of authors, editors and referees to facilitate reliable evaluation and comparison of data; it covers descriptions of experiments, reduction of data and presentation of final numerical results, and is supported by an extensive bibliography relevant to specialized subject fields;
- Guidelines for the preparation and presentation of dissertations;
- Guidelines for the presentation of conference proceedings;
- Guidelenes for the preparation of titles for scientific and technical reports and articles.

Mr. Chairman,

During this Symposium, many speakers and participants raised questions and made proposals concerning the future role of UNISIST in the field of transfer of information on ongoing research. As examples, the following citations could be made:

1. Mr. WESTRUM mentioned that no singled country can solve ~~all~~ problems related to information on ongoing research and Mr. SAMAHA added that international involvement is required.
2. Mr. WESTRUM also stressed that better international mechanisms should be developed for information on ongoing research in order to monitor new advances in science.
3. Mr. LAZAR and Mr. DE GROLIER stressed the urgent need for unification of methods of information handling in ongoing research.
4. Several speakers, such as Miss TORRIJOS and Mr. NEELAMEGHAN, underlined the desirability of standardization in this field and requested international guidelines.
5. Many other speakers such as Mr. EL HADI and Mr. SAMMANI stressed the need for technical assistance to be provided at national level for the establishment of appropriate information infrastructures which should correspond to national conditions and requirements.

This list of desiderata and proposals is not complete.

In attempting to answer this question and in accepting the suggestions made, I should like to stress that I have discussed at great length during these three days, with the Chairman of this symposium and I have taken into account his analysis and his synthesis of the debates. He will be sharing his analysis with you in concluding the meetings. I would only like to say that the role of UNISIST in the establishment of information systems in ongoing research could be considered as conceptual and methodological. The aim of the programme, as I said at the beginning, is to serve as a conceptual framework for present and future information systems. Its main task in this field could consist in the unification of methods and in the harmonization of international efforts in the field of transfer of information on ongoing research. Concrete actions in this field in the future could be formulated as follows:

1. To develop projects dealing with guidelines for unification for handling procedures, such as data elements, communications, formats, etc. for the improvement of information transfer. This work, of course, requires the involvement of national and international organizations such as ICSU, ISO, FID and also operating systems.
2. To develop a programme for advisory services based on national needs and providing technical assistance to Member States for the establishment and development of national services on ongoing research within the global, scientific and technical information systems. In this connection, I would like to mention that it is not our intention to develop parallel or overlapping systems.
3. To encourage the development of international cooperation in this field by organizing scientific meetings publishing directories and acting as an international focal point for information on ongoing research. For this purpose it will be advisable to set up an appropriate mechanism. Today Miss TORRIJOS proposed a working group or ad hoc committee. This committee could be established within the UNISIST programme in order to determine areas of cooperation and to assist the UNESCO Secretariat in the development of its programme and, finally, to propose pilot projects and evaluate the results of UNISIST's work in this field.

DISCUSSION, Session IV, Part 2.

Moderator: J. GRAY,
Head of Research and
Development Department,
British Library,
United Kingdom

J. GRAY: Well, ladies and gentlemen, I think we must all be feeling a little bit like heavy weights in a world championship approaching the 15th round, but the end, I think, is now in view. We have three more international systems to review very quickly, followed by two papers which are more in the nature of rounding up the whole symposium, one by Mr. WYSOCKI, who will, no doubt, indicate where the work of this symposium will fit into the future programme of UNISIST, and the last one, Mr. President, from yourself no doubt, clearing up any issue that hasn't already been cleared up by Mr. WYSOCKI.

Discussion of the paper by R. SAUTEREY /presented by C. NADEL/

J. GRAY: May I start the discussion by asking Miss NADEL to present her paper. This morning, one or two speakers pointed out the importance in research inventories, of having this information within the same system of information on published results of research. Now, you have been connected with a system which has done this like when you described exactly how two sets of information are related. Have you had any feedback from your users, say in France or other countries, on how useful they have in fact found this: having both sets of information at their disposal through one system?

C. NADEL: Oui, Monsieur le Présiedent, nous avons une rétroaction entre les deux systèmes et malgré les précautions prises, tout le monde connait les difficultés de faire sortir des littératures souterraines, même dans des organisations qui avaient déjà des systèmes de documentation opérationnels depuis quelques années. Parmi les pays membres de la DIRR, grâce à l'interrelation entre les deux systèmes, la diffusion des fiches recherche et des fiches documents répondant à une même question et passant largement les frontières de chaque organisation, nous avons pu faire ressortir des informations publiées qui n'avaient pas été traitées en tant que publications. Ceci a pu être réalisé grâce à des questions reçues et aussi aux contacts pris entre chercheurs et entre groupes de recherche. Je dois dire, qu'au Laboratoire Central, nous préférons de beaucoup parler de profil de recherche plutot que de profil de chercheur, je crois que ça correspond chez nous, dans la recherche routière, à une plus grande réalité. De ce point de vue, l'interrelation interne, puisque j'ai parlé d'un fonds documentaire unique, est extrèmement efficace.

Discussion of the paper by Ju. SOROKIN

E. DE GROLIER: Je voudrais poser une question à Monsieur SOROKIN: est-ce que le système de classification et le thesaurus utilisé dans son organisme sont les mêmes que ceux qui sont utilisés dans le VNTC et s'il n'en est pas ainsi, quelles sont les méthodes utilisées pour assurer la compatibilité? Ensuite, M. SOROKIN nous a parlé d'un macrothesaurus, est-il du type de celui présenté par Mme WOLFF-TERROINE, ou d'un autre type? S'agit-il d'algorithme de traduction entre les différents systèmes? Pourra-t-il nous donner quelques compléments d'information à ce sujet?

J. SOROKIN: Our rubricator for the system on ongoing research is similar to the rubricator used by VNTC , Mr. MALOV's Establishment. The macrothesaurus will be common to all other subsystemes including branch subsystems and special subsystems. The ideology of our thesaurus seems to me to be closer to the ideology of Mrs. WOLFF-TERROINE's thesaurus.

Discussion of the paper by A. WYSOCKI

J. GRAY: Thank you for what I think is a very hopeful review of the position of UNISIST in relation to the subject field we are talking about today, for the very quick almost stop-press review of some of the important things that have come out of the meeting and for the proposals for future action with which you have summarized your talk. Perhaps it might be useful just to recall, as I have a copy of the last part of Mr. WYSOCKI's talk, - the actual proposals that he put forward - 1/ Just to develop projects dealing with guidelines for unification of handling procedures, improvement of information transfer, 2/ to develop a programme for advisory services and technical assistance for the development of national information services, etc., 3/ to encourage the development of international co-operation in this field by organizing scientific meetings and acting as an international focal point.

Now, we have about half an hour in which we can both discuss the details of this paper and hear the concluding remarks from the Chairman of the Symposium. I am not sure when that happens incidentally whether I will be moderating him or he will be moderating me, but I think that we know each other well enough not to mind which way it goes.

May I suggest that we take this discussion in two parts: first, could we have any comments on important points coming out of this meeting, in other words, has Mr. WYSOCKI comprehensively covered what you think to be the most important lessons of this symposium or would you like to add other points; secondly, has he listed actions for UNISIST to take in the future that accord with your idea of what the priorities might be or would you like to amend them in any way or add to them; and thirdly, have you ideas to help the UNISIST Secretariat in implementing these ideas in future? I am not suggesting if you have no ideas now you shouldn't have them later on.

So may I ask first of all, are there any views on the important things that have come out of this symposium that haven't already been summarized in Mr. WYSOCKI's speech?

M. TEJEDA: I think there is a point missing in the exposé of Mr. WYSOCKI. I would like to ask him how he sees, within the framework of UNISIST, the role to be played by other international organizations which are actively engaged in the promotion of information services and systems outside the United Nations System?

J. GRAY: I think it is best to take all questions, then answer them in one go if that is all right with the members.

N.St.DUMITRESCU: J'aimerais faire une proposition, Monsieur le Président. Etant donné les particularités de l'information sur les recherches en cours et des documentalistes ayant à charge les systèmes correspondants, je considère que l'UNISIST devrait se préoccuper de la formation de ces documentalists, de la mise à jour de leurs connaissances, du statut de ce qui au fond me semble se dessiner déjà comme un type différent des professionnels de la documentation. /La FAO pourrait s'associer à une telle initiative./ Et deuxièmement, je voudrais faire une brève déclaration qui constitue à la fois un commentaire à la présentation de M. WYSOCKI et une réponse à l'anxiété exprimée par M. ROMDHANE. AGRIS est venu au monde après que le programme UNISIST eut été établi, et peut être considéré comme une application sectorielle de l'UNISIST dans le domaine de l'agriculture. Le système CARIS, à la suite des exigences et des urgences du programme de la FAO, a dû être établi avant que l'UNISIST ne s'occupe de l'inventaire des recherches en cours, mais il a été conçu par la même équipe qui a projeté AGRIS et avec le souci permanent d'être compatible avec lui.Donc CARIS doit être considéré comme répondant avant la lettre aux exigences de l'UNISIST.

H. KREIMER: Wouldn't it be optimal to integrate at least the information systems promoted by UNESCO itself and that means to integrate the international information system in research and documentation ISORID into UNISIST?

J. GRAY: I think the questions and discussion are now moving into the second area that I outlined at the beginning, that is to say, to matters dealing with the actual proposals for future activity, so perhaps it might be more convenient to keep these two together for the moment, in which case I was wondering whether Miss TORRIJOS from the Philippines, who made some proposals this morning,would like to make any contribution. Does she feel that the ideas put forward by the Secretariat have come near to the kind of thing she had in mind?

D. TORRIJOS: I think that Mr. WYSOCKI has exhaustively covered the points I raised this morning. I feel very grateful and flattered that he has included several points.

M. EL HADI: May I suggest to Mr. WYSOCKI that the UNISIST programme take into consideration the new development of information systems on a regional basis as well as existing advisory services within UNESCO and outside organizations. This would help us a great deal in the developing countries to find at UNESCO a unified body. I would also suggest to UNISIST, that they rationalize the creation of the new systems so as not to let us be flooded by so many systems and help us, in the developing world, to be better acquainted with the new systems and with the compatibility problems.

A. NEELAMEGHAN: I am not quite sure whether Mr. WYSOCKI's idea of providing advisory service covers the point I want to raise that is about guidelines for the education of users. Probably this is covered in the overall general programme of UNISIST, but, however, I suppose, when we are taking into consideration the current research information system, this should also cover the education of users.

P. LAZAR: Just two comments on the first point in the plan of action of Mr. WYSOCKI: First I fully support the comment of Mr. DE GROLIER. Second, would it not be possible to make the text a little bit stronger by saying guidelines and international standards instead of guidelines only, because I see some possibility of having some international standards passed in this field and it might be very important to get to this point as well.

A. WYSOCKI: I shall reply first to the question raised by the representative of OAS, who asked me how UNISIST will harmonize the work in this field of international organizations which are not members of the UN family. We have gained some experience with the UNISIST programme since we have been co-operating not only with the UN organizations, but also with organizations which are not members of the UN family of which have the affiliated status like OAS has. Therefore I see no problem in inviting the international organizations outside the UN system to co-operate with us in this field.

Mr. DUMITRESCU and Mr. NEELAMEGHAN raised questions dealing with the training problem. I did not mention the training activity in my proposal, because it is covered by the general UNISIST programme both on the specialists side and on the users side. We have already incorporated the desiderata for training of users and training of information specialists. Therefore we are not proposing a new programme or projects in this field.

Mr. KREIMER from the Federal Republic of Germany asked for acceleration of the integration process with the UNISIST programme and proposed the concrete integration of ISORID into UNISIST. I will transfer this proposal to the Direction Générale of UNESCO.

Now, three comments were made by Mr. EL HADI, which I appreciate very much: First, to take into consideration the development of information systems on a regional scale. Of course, we would like to start with national level, because most of the speakers, I observe, stressed the importance of starting with national systems, as did Mr. SAMMANI, Mr. LAZAR and others. This is the most important component of information transfer and we cannot start regional or international co-operation if we do not have the national basis. We are, therefore, proposing to start with the national information systems or services on ongoing research. This does not mean that we will not consider international and regional information systems in this field, but the priority should be given to the national needs. Secondly, thank you for the comment about the advisory services, we will take them into account, but we would prefer not to have too many different advisory services and we would like to coordinate them with existing services in order to prevent the proliferation of advisory actions. Thirdly, you mentioned that we should help in the development of compatible systems and I think your suggestion is closely linked with the two other comments asking to change my proposal for a unification of handling procedures to a proposal for dealing with the compatibility of systems and services. Therefore I am not answering any futher comments on this subject.

Mr. DE GROLIER proposed for immediate action to have the inventory of inventories made and have it published for the next meeting. We will take this into account and we will propose making such a directory. Concerning the social sciences, I would like to inform you that the Steering Committee of UNISIST voted a resolution a few days ago asking the General Conference to accelerate the extension of the scope of UNISIST to Social Sciences. This will happen fairly soon.

The last comment of Dr. LAZÁR concerns the guidelines and international standards. As you know, ISO is the one responsible for international standards. Since we co-operate closely with this organization,we will propose to it the establishment of international standards.

J. GRAY: Right now, Ladies and Gentlemen, I think we must bring this very successful symposium to a close. I am going to ask your indefatigable President, Chairman, who put so much into the organization of the whole symposium as well as the conduct of it throughout the last 3 days to make his concluding remarks.

D. HERSEY: Thank you Mr. GRAY. I could conclude by making all kinds of formal remarks about what was discussed, but you and I have been here for three days and have heard essentially the same things and I think in some cases we may go away with slightly different versions of what it all means. Let me tell you very briefly what I derived from the meeting and what I think it means for the future.

First of all, when we began planning for the symposium, it was our intent to identify as many organizations as possible throughout the world which had an interest in ongoing research information, either in terms of actually operating systems or in terms of contemplating the development of such systems, and to determine whether sufficient interest existed in this area to warrant a more formal mechanism for continuing the dialogue. As you know, more than 200 individuals registered for the symposium. There are, I am confident, numerous other organizations which are also in the process of developing or operating ongoing research information systems which could not join us. I think in terms of the objectives of the symposium, that we were able to present a spectrum of the kinds of information systems currently in existence; we have illustrated a certain commonality of problems in the collection and processing of ongoing research information; we have looked at the question of user needs and have noted a variability among user needs which related in many cases to individual differences between countries. I think we have also idientified a potential for international exchange; we have heard from some of the systems which have already begun efforts to obtain information on an international basis, about the problems they are running into, the successes which they have had and the areas where we know that there must be future dialogue.

But, let me summarize what I think is very important in terms of what might be done by UNISIST after this meeting. I look on this occasion, not so much as the closing of a symposium, but rather as the beginning of improved communication among organizations we heard from or which were represented here as well as all other organizations engaged in similar work throughout the world. It is unfortunate that many of these could not be present, particularly those from the developing countries which were unable to attend.

I would hope to see a more formal mechanism set up through UNISIST, as we have just heard Dr. WYSOCKI suggest, which would begin to deal with the many problems noted and discussed during the meeting.

Having identified a large number of people interested in ongoing research information systems, I believe it would also be desirable to develop a directory of international ongoing research information systems.

But I don't think we should abrogate our individual responsibilities to communicate with one another by leaving the entire responsibility for future dialogue to an international group. I totally support the concept that the commonality of our problems suggests that efforts toward their resolution might best be undertaken through an organization such as UNISIST.

On the other hand, I think there are many opportunities for progress on a bilateral basis which would in no way detract from this international effort. We won't know, of course, what the international aspects will be until the future, but I hope you will agree with me that the symposium has achieved in large part many of the objectives which were set forth. Thank you very much.

OTHER CONTRIBUTIONS SELECTED BUT NOT PRESENTED AT THE SYMPOSIUM

AUTRES EXPOSES SELECTIONNES MAIS NON PRESENTES AU COURS DU COLLOQUE

J.N. AQUISTAPACE,
Scientific Secretary,
European Coordination Centre
for Research and Documentation
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Austria

FOR A PILOT EXPERIENCE IN THE SOCIAL SCIENCES: A PROPOSAL FROM THE EUROPEAN COORDINATION CENTRE FOR RESEARCH AND DOCUMENTATION IN SOCIAL SCIENCES

Summary

In the social sciences the need is becoming felt for a standardized international system of information on ongoing research, whose facilities would extend beyond the bibliographical and documentary information on which efforts on standardization have hitherto been exclusively centred.

At the present time a large number of services of this type exist. They are all characterized by the following features:

- the narrowness of the field of application /limitation to one discipline, one research field, one institution or even one country or a restricted group of countries/;
- the compartmentation of each system from the others, each having developed separately on different bases;
- their distinctly "Western" aspect, due to the fact that many regions of the world /including the socialist countries of Europe/ have virtually never been associated with this type of work.

The possibility now seems to be afforded of a coordinated effort. The Vienna Centre /European Coordination Centre for Research and Documentation in Social Sciences/ is prepared to be associated with such an effort, and suggests that a pilot experiment be carried out on cross-national comparative research studies conducted on a co-operative basis which have to commend them:

- their clearly multidisciplinary aspect;
- the variety of the investigation methods and analytical instruments used;
- the value of information on such studies both to researchers and to institutions.

Résumé

POUR UNE EXPERIENCE PILOTE DANS LES SCIENCES SOCIALES: UNE PROPOSITION DU CENTRE EUROPEEN DE COORDINATION DE RECHERCHE ET DE DOCUMENTATION EN SCIENCES SOCIALES

Dans les sciences sociales, le besoin se fait sentir d'un système standardisé international d'information sur les recherches en cours, système qui permettrait de dépasser la seule information bibliographique et documentaire où se sont jusqu'à présent concentrés les efforts de normalisation.

A l'heure actuelle, un grand nombre de service de ce type existe. Tous sont caractérisés par les traits suivants:

- étroitesse du champ d'application /limitation à une discipline, à un pays ou groupe restreint de pays/;
- isolement de chaque système par rapport aux autres, chacun s'étant développé séparément sur des bases différentes;
- aspect nettement "occidental" du fait que de nombreuses régions du monde /et notamment les pays socialistes d'Europe/ n'ont pratiquement jamais été associées à ce type de travaux.

La possibilité d'un effort coordonné semble aujourd'hui ouverts. Le Centre de Vienne /Centre Européen de Coordination de Recherche et de Documentation en Science Sociales/ est pour sa part prêt à s'y associer et suggère qu'une expérience pilote soit tentée sur les recherches transnationales comparatives menées de façon coopérative qui présentent les avantages suivants:

- le caractère international de ces recherches, par nature;
- leur aspect nettement multidisciplinaire;
- la variété des méthodes d'enquête et des instruments d'analyse utilisés;
- l'intérêt que présente l'information sur ces recherches tant pour les chercheurs que pour les institutions.

FOR A PILOT EXPERIENCE IN THE SOCIAL SCIENCES: A PROPOSAL FROM THE EUROPEAN COORDINATION CENTRE FOR RESEARCH AND DOCUMENTATION IN SOCIAL SCIENCES[1]

J.N. AQUISTAPACE

Introduction

With the development of sciences and the growth of communication between specialists and researchers, scientific documentation has become of extreme importance. The social sciences have followed this movement. In view of the increasingly growing abundance of documentation resulting from research work, the first - and most urgent - task undertaken has been the development of instruments of classification and indexing and the publication of selective bibliographies by sectors or disciplines presenting the works and articles in a systematic way. All these instruments are mainly directed towards making the relevant documents more accessible and, consequently, developing communication between the researchers, above all enabling them to devote less time to the finding of documents which they need for their own work.

However, experience seems to show that the effective use of bibliographical instruments increasingly implies the utilization by the researcher users of often complicated techniques of documentary classification, retrieval and description. It also implies that these researchers have a knowledge of the range of existing instruments. Finally, once the references are detected, the researchers should, if they want to obtain the documents they consider interesting, call on specialized documentalists who know where these documents are available and how to obtain them.

It could be asked whether it would not be better to complete the information on scientific publications with information on the research projects themselves. Researchers increasingly tend to communicate with one another directly when they know that other people are working in the same domain. This direct communication often makes it possible to avoid duplication of bibliographical research efforts /the researchers will directly exchange their information and their own publications/, further mutual information increase the knowledge of work carried out simultaneously in different institutes or countries, stimulate interest for perhaps neglected aspects of a studied domain, etc. In short, it represents a more practical, faster, and sometimes more effective system of information than the compilation and diffusion of bibliographical documents.

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[1] Grünangergasse 2, 1010 Vienna, Austria

The "Vienna Centre" is an autonomous body of the International Social Science Council and was founded in 1963 under the auspices and with the financial help of UNESCO. Its primary objective is the development of collaboration between social scientists from European countries having different socio-economic systems. Its main activity is the coordination of cross-national comparative research studies undertaken on a cooperative basis by social scientists from both East and West European countries. To date the Centre has initiated and coordinated 20 cross-national projects - involving more than 250 research institutions. It presently receives regular financial support from 20 East and West European academic or governmental bodies.

The development of social sciences in the industrialized countries also implies that many research domains exist in each country that can be studied from very similar angles. The researchers have an increasing need to know what is being done elsewhere in their special branch. Congresses, seminars, and international symposia do not always enable them to establish working contacts, and only a minority of researchers have the time and resources to take part in these meetings.

Finally, research work is of interest not only to the researchers. To the extent in which research implies the use of increasingly tight resources, the planners and "decision makers" also have a need to know about work going on elsewhere, the conditions of realization, etc. Information of a bibliographical nature is rarely of use to them.

All these elements seem to speak in favour of a system that would make it possible to supply rapid information that is both precise and standardized on ongoing research in social sciences in the different countries.

1. Current systems of information in social sciences

At the present time the majority of national scientific councils and large research centres have a collation system for ongoing work carried out under their auspices or financed by them. This system generally takes the form of an inventory /annual or otherwise/, which often only includes the titles of research projects and the names of researchers and institutions. Sometimes these projects are classified by discipline or by domain. In some rare cases, more precise information is given on the methods used, instruments employed, and types of data collected. Inventories also exist that are drawn up by international organizations /or established with their assistance/ describing ongoing research projects in the member countries for this or that precise domain /e.g. sciences of education, demography, criminology, etc./.

Mention should also be made of two particular systems: the DARE programme, established by the UNESCO Service of Documentation in Social Sciences, and the archives of the Dokumentationszentrum in Bonn /FRG/. These two systems have the common characteristic of being more elaborated technically /automated/ than most of the others and of covering social sciences as a whole. However, the former seems to have been unable to obtain the indispensable active collaboration of different leading bodies for research and documentation in social sciences in the various countries, and the latter does not go beyond the limits of Germany and the German-speaking European countries.

The essential characteristic of all systems with which we have become acquainted is their extreme diversity: without mentioning the problem of the language /each country usually uses its own language/, it can be noted that practically no two systems exist that are based on the same methods of data collection, description and indexing, or have a similar presentation. In addition, each system has had the tendency to develop in an isolated manner to the extent in which it has been implemented by one single national or international institution. In such a domain, the centralization in one institution of all the operations implies the mobilization of very large resources. If adequate financial support is lacking, the result is that the system is either limited to the level of very poor information or even becomes incapable of functioning.

A cooperative formula that would divide up the financial costs between several institutions could avoid such difficulties. It would also have the advantage of integrating a large range of sources of information and of ensuring a better dissemination of the information received.

Finally, it should be noted that the majority of systems of information on ongoing research projects in the social sciences have up to now essentially covered work carried out in the industrialized countries of the West. In Europe, the cooperative efforts to establish systems covering certain research domains /sciences of education, criminology, for instance/ have, above all, concerned western countries. If it is desired to broaden both the basis of information collection and the scope of its dissemination, it would be eminently desirable that a maximum of national institutions, both from the East and from the West, collaborate from the preliminary stage onwards to the establishment of the envisaged system.

2. Proposal for a pilot experience

The establishment of an international system of information on ongoing research projects in the social sciences would have to take into account past experiences in order to avoid re-encountering the same obstacles, i.e., centralization in one institution, specialization to one discipline or one research domain, or limitation to a restricted group of countries. In view of the size of the field covered /social sciences as a whole/, it would doubtless be better to start with a restricted sector but one that is sufficiently representative to be later enlarged without meeting with major difficulties.

Cross-national comparative research could constitute such a sector. It presents the following advantages:

I. By definition these research projects are international, and when they bring together researchers of different countries, their cooperative charcter bears witness to the interest which the studied domain presents in several countries;

II. They are often multidisciplinary and cover a wide range of fields of study;

III. The methods of survey and analysis used in these studies are sufficiently varied to provide a reasonable sample at the international level.

The European Coordination Centre for Research and Documentation in Social Sciences, an autonomous body of the International Social Sciences Council, has for more than 12 years been coordinating such research projects carried out jointly by researchers from Eastern and Western Europe. It has today become the most important European promoter of cross-national comparative research which, by associating /as a function of common objectives/ research teams working in their respective countries on comparable problems, contributes towards a better exchange of scientific information, to a deeper mutual knowledge, to a fruitful comparison of methods and techniques and to a broadening of concepts in the social sciences.

It is this very development which has led to the submission, to various relevant institutions, of a proposal to establish a system of information on ongoing comparative cross-national research projects to serve as a pilot experience for a broader ulterior system for all research in social sciences.

If this proposal gains the interest of a reasonable number of national institutions of research and documentation in social sciences, the Vienna Centre would be ready to ensure a coordination service at the European level within the limits of its competence and resources.

Attached to this document is a draft research description plan prepared by the Vienna Centre as well as an attempt to describe a research project coordinated by the Centre. Of course, this plan only represents a preliminary attempt which would have to be discussed, among other questions, by the institutions interested in the project. An attempt has been made to include the majority of essential characteristics, with the aim of guiding the description of research projects not only in order to make possible the retrieval of data collected for an eventual secondary analysis, but mainly in order to concentrate the greatest possible amount of information on all characteristics of these research projects /organization, financing, participants, techniques used, documentation, time-table, meetings, etc./.

The plan is divided into five parts coverint the various describable aspects of a research project:

1. Identification /title, references and sources/;
2. Aims /definition, nature and dimensions of the research/;
3. Data collection and analysis;
4. Outputs /documents, data stored/;
5. Organization /leadership, coordination, sponsorship, financing participation/.

Some items /above all in the second and third sections/ are conceived to make possible the use of key-words or analysis by means of descriptors /in particular the items 211, 212, 213, 214, 311, 312, 321, 322, 423/. It is clear that the definite establishment of such a description plan implies the help of other specialists.

The establishment of an information system is not reduced to the working out of a description plan; among the other problems that would have to discussed are the following:

- means of collection of information and its dissemination;
- degree of automation of information processing and conditions of storage and access;
- distribution of tasks between the institutions making up the network.

In order to carry out this project, it seems that the natural partners that should be associated in it are the academies and national social science research councils, and more particularly, the services of documentation and information attached to them. These bodies are, in fact, the best places to collect and transmit information dealing with ongoing research projects, and are also the first potential users of such a service because they orient, co-ordinate and finance the research in their respective countries. It is with their representatives that the practical aspects of this project should be studied and, above all, the formal agreements of collaboration and exchange between the parties concerned should be made.

Annex

RECOR

PLAN DE DESCRIPTION DES RECHERCHES
PROJECT DESCRIPTION SCHEME

1. IDENTIFICATION

1.1. Titre/Title

1.1.1. Titre /en anglais et en français//Title /in English and French/

1.1.2. Titre en langue originale /si ni anglais ni français//Title in original language /if neither English nor French/:

1.1.3. Sous-titre/Subtitle

1.1.4. Abréviation/Shortened title

1.2. Références et sources

1.2.1. Recherche globale/overall project /Ref.:/

1.2.2. Recherches groupées sous ce titre/Studies covered under this title /cf.:/

1.2.3. Source d'information pour la présente description/Information Source for the present description

1.2.4. Observations/Remarks

2. BUTS/OBJECTIVES

2.1. Définition de l'étude

2.1.1. Disciplines concernées/Disciplines involved

2.1.2. Domaines couverts/Subject areas

2.1.3. Sujets étudiés/Items investigated

2.1.4. Buts et principales hypothèses/Aims and main hypothesis

2.2. Nature et dimensions de l'étude/Characteristics and dimensions of the study

2.2.1. Dimensions temporelles/Time Dimension:

2211 - Etude pilote/Pilot study
2211 - Etude originale unique/One time original study
2213 - Réétude partielle/Partial replication
2214 - Etude par panel/Panel study

2.2.2. Calendrier/Agenda

2221 - Année de début/Starting year
2222 - Année d'achèvement prévu/Envisaged year of completion
2223 - Calendrier/Agenda
2224 - Etat actuel des travaux/Present state of work

2.2.3. Aire géopolitique/Geopolitical area

2231 - Europe occidentale/Western Europe
2232 - Europe orientale/Eastern Europe
2233 - Pays nordiques/Nordic countries
2234 - Amérique du Nord/North America
2235 - Amérique Latine/Latin America
2236 - Afrique/Africa
2237 - Proche Orient/Middle East
2238 - Asie et Extrême Orient/Asia and Far East
2239 - Pacifique/Pacific

3. RECUEIL ET ANALYSE DES DONNEES/DATA COLLECTION AND ANALYSIS

3.1. Recueil des données/Data collection

3.1.1. Méthodes de recueil des données/Data collection methods

3111 - Compilation et analyse de documents et de données primaires/ Compilation and analysis of documents and primary data
3112 - Enquête observation/Observation survey
3113 - Enquête par sondage/Sample survey
3114 - Analyse du contenu/Content analysis

3.1.2. Instruments d'enquête/Survey instruments

3121 - Interview oral/Oral interview
3122 - Interview avec questionnaire/Interview with questionnaire
3123 - Questionnaire écrit/Paper and pencil questionnaire
3124 - Tests
3125 - Techniques sociométriques/Sociometrical techniques
3120 - Autres/Others

3.1.3. Caractéristiques de l'échantillon /si enquête par sondage//Sample's characteristics /if sample survey/

3131 - Population/Universe
3132 - Mode d'échantillonnage/Sampling procedure
3133 - Nombre/Number

3.2. Analyse/Analysis

3.2.1. Type d'analyse/Type of analysis

3.2.2. Instruments d'analyse/Analytical instruments

3.2.3. Traitement des données/Data processing

4. PRODUITS/OUTPUTS

4.1. Documents disponibles/Available documents

4.1.1. Documents de travail/Working documents:

4111 - Rapports initiaux et intermédiaires/Initial and intermediary reports
4112 - Rapports nationaux/National reports
4113 - Rapport final/Final report
4110 - Autres documents/Other documents

4.1.2. Articles:

4.1.3. Livres/Books:

4.2. Archives

4.2.1. Localisation du centre d'archives où les données ont été déposées/ Location of the archive centre where data are stored

4.2.2. Accès/Accessibility

4.2.3. Brève description des données archivées/Brief description of the data stored

5. ORGANISATION

5.1. Direction et coordination/Direction and coordination

5.1.1. Direction scientifique/Scientific direction

5.1.2. Coordination/Coordination

5.1.3. Parrainage, client/Sponsorship, client

5.2. Fonctionnement du groupe de recherche/Functioning of the research group

5.2.1. Comités et sous-groupes de travail/Working committees and sub-groups

5.2.2. Langues de travail/Working languages

5.2.3. Réunions de travail/Working meetings

5.3. Financement/Funding

5.3.1. Type de financement/Type of funding:

5311 - International par l'intermédiaire d'une organisation internationale/International through international organization
5312 - International par plusieurs organisations internationales/ International through several international organizations
5313 - D'un seul pays/From one country
5314 - Multinational/From several countries

5.3.2. Financement au niveau national/Funding at national level

5321 - Source/s/ privée/s//Private source/s/
5322 - Source/s/ publique/s//Public source/s/ /CRA = Conseil de recherche - Académie/Research Council - Academy, ENT = entre-

prise nationale/public corporation, GOV = organisme gouvernemental/governmental body, UNI = université/university

5323 - Sources mixtes /publiques et privées//Public and private sources

5.3.3. Coût global estimé/Estimated global cost

5.4. Participation

5.4.1. Chercheurs participants et institutions dont ils rélèvent/Research workers and institutions involved

/DIR = directeur ou co-directeur du projet/Project director or co-director

COO = Coordinateur/Coordinator

EXP = Expert

OBS = Observateur/Observer/

RECOR

NUMERO/NUMBER 1974/001

DATE :	MISE A JOUR/UPDATING
05/03/74	15/05/75

1.1.1. COST OF URBAN GROWTH/LE COUT DE LA CROISSANCE URBAINE

1.1.4. CURB

1.2.3. European Coordination Centre for Research and Documentation in Social Sciences (Vienna Centre), Grünangergasse 2, Vienna.

2.1.1. Economics, Geography

2.1.2. Urban planning

2.1.3. National urban change and urban policy; commuting; demographic and economic change in the selected functional urban regions; public and private expenditures for : housing, transport, economic services, sanitation, health, social welfare, education, culture, security, administration. Cost of living.

2.1.4. (a) To identify and measure the cost structures associated with urban systems of a given size (a static analysis) but more emphasis will be given, as we view growth as an increment of change, to a dynamic analysis to identify and measure the costs associated with increments of change.

(b) To identify and measure the explanatory variables determining within each country the characteristics of the resultant cost structures and to ascertain those contextual variables which explain the similarities and differences in the national cost patterns.

(c) To trace evolution of costs dependence chains between elements overtime and space : to assess the deterministic character of such chains and assess effect of technological, physical and capacity thresholds on such patterns.

(d) For key response cost elements, to examine the role of decision makers in influencing expenditures and to assess whether there are real or apparent constraints in the expenditure systems themselves on the decision makers.

2.2.2. 2221 - 1971

2222 - 1977

2223 - 1st stage : Trend analysis (national urban change and urban policy) and first cross-national synthesis; 2nd stage : Re-evaluation of objectives and methodology, selection of functional urban regions, collection of time series data; preparation and pre-testing of questionnaire for the household survey and cross-national comparison of data; 3d stage : Analysis of relationship between dependant variable, explanatory and contectual variables. Assesment of sensitivity of cost elements to urban change. Selection of key-response variables. Description and statistical comparison of cross-national trends; 4th stage : Detailed investigation into key response variables; 5th stage : Preparation of final national reports and cross-national comparison of cost data to asses characteristics with (a) changing urban trends, (b) cities of same size and (c) cities of different size.

2224 - First stage completed at national level. Methodology of the second stage under discussion.

2.2.3. 2231 - A, B, CH, F, GB, I, NL

2232 - BG, CS, H, YU

2233 - S

3.1.1. 3111 - For the trend study (first stage), compilation and analysis of primary data (national urban statistics) covering all the cities of more than 10.000 inhabitants in each country.

3.2.1. Trend analysis, time series analyses (first stage).

3.2.2. Correlations, indices, cross-tabulations.

4.1.1. 4111 - G. Gaudard & J. Vallarché : Propositions d'un projet de recherche "Le coût de la croissance urbaine" (WD No 4/February 1971); Plan révisé de recherche (WD No 1/January 1972)

- Minutes of the 1st meeting of the Restricted working party, Prague, 5-7 June 1972 (WD No 5/June 1972)
- R. Drewett & R. Petrella : Definitive Proposal of Research Design and Research Methodology, A Paper for Discussion at the 2nd General Meeting, Bled (Yugoslavia) 26-30 September 1973 (WD No 11/September 1973)
- R. Drewett, R. Petrella, E. Daroczi: Evaluation of the results of the exploratory stage and proposals for the substantial research study (WD No 9/June 1973)
- R. Drewett & Barry J. Garner : Guidelines for the Completion of Stage 1 (a) A Review of National Urban Change 1960-1970 (WD No 1/January 1974).
- A list of other working documents from 1971 to 1975 is available.

4112 - National reports (trend study) on B, BG, CH, F, GB, H, I, NL, S, YU

5.1.1. Dr. R. Drewett (Great-Britain)

5.1.2. Vienna Centre (Mr. Marcus Metelka)

5.2.2. English

5.2.3. Plenary sessions : A 1972 (Vienna), YU 1973 (Bled), H 1974 (Visegrad), PL 1975 (Warsaw)

Restricted meetings : CS 1972 (Prague), A 1973 (Kaltenleutgeben), BG 1973 (Sofia), B 1974 (Brussels)

5.3.1. Multinational funding

5.3.2. 5321 - B

5322 - A (Gov), BG (CRA, UNI), CH (UNI), CS (CRA, GOV), F (UNI), GB (UNI), H (GOV), I (UNI), S (UNI), YU (GOV)

5323 - NL

5.4.1. A - Dr. Helfried BAUER (Kommunalwissenschaftliches Dokumentationszentrum, Vienna)
Dr. Uwe SCHUBERT (Hochschule für Welthandel, Vienna)

B - Dr. Herman BAEYENS (Director General, Mens en Ruimte V.Z.M, Brussels)
Mr. Hugo ABTS (Mens en Ruimte, Brussels)

BG - Dr. Hristo GANEV (Geology Geography Faculty, University of Sofia)
Dr. Petr POPOV (Deputy Director, Geographical Institute, Bulgarian Academy of Sciences, Sofia)

CH - Prof. Angelo ROSSI (Institut für Orts-,Regional- und Landesplanung, Zürich)

CS - Dr. Peter HALOUZKA (Institute of Geography, Czechoslovak Academy of Sciences, Prague)
Dr. Stanislav SOMMER (Institute of Economics and Management for Scientific and Technical Development,Prague)

DK - Prof. Barry J.GARNER /OBS/ (Geographical Institute. Aarhus University)

F - Mr. Jean-Louis BELLIARD (CENECO. Marly le Roi)
Prof. Claude LACOUR (Institut d'Economie régionale du Sud-Ouest, Université de Bordeaux)
Prof. Marc PENOUIL (id)

GB - Dr. R.H. ARMSTRONG (Institute of Local Government Studies, University of Birmingham)
Miss Margaret HOBSON (id)
Dr. Roy DREWETT /DIR/ (London School of Economics)

H - Miss Eta DARÓCZI (Economic Research Institute, Budapest)
Mr. Janos FARKAS (Central Statistical Office, Budapest)
Mr. György VUKOVICH (id)

I - Prof. Angelo CALOIA (Istituto di Scienze Economiche, Universita Cattolica del S. Cuore, Milan)
Prof. Lanfranco SENN (Department of Economics, University of Trento)

NL - Prof. Leo KLAASSEN (President, Netherlands Economic Institute, Rotterdam)
Mrs. L. VAN DEN BERG (id)
Mr. C.H.T. VIJVENBERG (id)

R - Mr. Gheorge CHEPES /OBS/ (Urban Sociological Laboratory, Bucharest)

S - Prof. Sven Olof ESTRÖM (Fyrkanstens Kansli, Lulea)
Mr. Magnus PETURSON (Department of Geography, University of Umea)

YU - Dr. Vladimir MUSIC (Urbanisticni Institut, Ljubljana)
Mr. Lojze GOSAR (id)

International - Mr. Marcus METELKA /COO/ (Vienna Centre)

K. FIALKOWSKI,
Director,
Institute for Scientific,
Technical and Economic Information,
Poland

Summary

AN AUTOMATED INFORMATION SYSTEM ON SCIENTIFIC RESEARCH, DEVELOPMENTAL AND APPLICABLE WORKS

Realization - within the framework of Scientific Technical and Organizational Information System - of an information system on scientific research, developmental and applicable works is to make the complex solution of problems connected with collecting, processing and disseminating of information in this particular domain.

There will be collected as well source documents as information in the shape of derived documents in this system.

It has been anticipated that principles concerning retrieval of abovementioned documents will be regulated by an adequate legal act being in force in the whole country.

Users of this system would receive through it both information of substantial character and information needed for efficient management and guiding the development of science and technology; in this case the system will perform, among other things, statistical reporting functions.

The scope and form of information disseminated by the system will be in any case conditioned by a kind of user, whom they will be designed for. Introduction of such a division is aimed at protection of information collections.

In the field of information exchange /i.e. information pertaining to scientific research, developmental and applicable works, completed in COMECON member countries/ the national system will strictly co-operate with the parallel international system, being established in Moscow.

It is being expected that - with a view to anticipated heavy information flow - all processes dealing with collecting, processing and disseminating of information will be automated to a great extent.

For these reasons, it is necessary to supply the Centre and the Institute for Scientific, Technical and Economic Information, i.e. institutions which will carry the system into effect and exploit it, with proper technological equipment, that is devices for purposes of informatics and photo-reprography.

Within the domain of informatics equipment the best guarantee of an efficient realization and then exploitation of the system would be the digital system JS R-50.

It has been provided for completing the works connected with realization of the system by the end of 1979.

Résumé

UN SYSTEME AUTOMATISE D'INFORMATION SUR LES TRAVAUX DE RECHERCHE SCIENTIFIQUE, DE DEVELOPPEMENT ET D'APPLICATION

L'établissement de ce système, dans le cadre du Système d'information sur les sciences, les techniques et l'organisation, vise à résoudre les problèmes complexes que posent la collecte, le traitement et la diffusion des renseignements dans ce domaine particulier.

Les données d'entrée seront tirées aussi bien de documents primaire que de documents secondaires.

Il est prévu que les principes applicables au dépistage de ces documents seront fixés par une loi qui sera mise en vigueur dans l'ensemble du pays.

Les utilisateurs du système recevront à la fois des renseignements de fond et les informations nécessaires à une organisation et une orientation efficaces du développement de la science et de la technologie. A cet égard, le système permettra notamment de compiler des rapports statistiques.

La nature et la forme des données diffusées dépendront, en tout état de cause, des utilisateurs auxquels elles sont destinées. Cette règle a pour objet d'empêcher les divulgations abusives.

En ce qui concerne les échanges d'informations relatives aux travaux de recherche scientifique, de développement et d'application effectués dans les pays membres du COMECON, le système national polonais coopérera étroitement avec le système international parallèle qui est en cours de création à Moscou.

Compte tenu du grand nombre des données attendues, il est prévu que la collecte, le traitement et la diffusion des informations seront très largement automatisés.

Il faudra donc que le Centre et l'Institut pour l'information scientifique, technique et économique, qui seront chargés d'élaborer et d'exploiter le système, disposent du matériel d'informatique et de photo-reprographie requis. Dans le domaine de l'informatique, c'est le système numérique JS R-50 qui semble donner les meilleures garanties d'efficacité tant au stade de l'organisation qu'à celui de l'exploitation du système.

La mise en place du système doit être achevée à la fin de 1979.

AN AUTOMATED INFORMATION SYSTEM ON SCIENTIFIC RESEARCH, DEVELOPMENTAL AND APPLICABLE WORKS

K. FIALKOWSKI

Purpose and aims of the system

The automated information system on scientific research, developmental and applicable works will be a component of the integrated nation-wide Scientific, Technical and Organizational Information System, hereinafter called STOIS /for Polish SINTO/. The discussed system will fulfil all specialized functions concerning the problems of collecting, processing and dissemination of information on scientific research, developmental and applicable works. There will be information on all works of this kind, both those just undertaken or already completed within the country, as well as information of similar character disseminated by international information services /for instance, by the International Centre of Scientific and Technical Information /ICSTI/ in Moscow/. It should be expected that realization of such an information system will be a substantial step towards improvement of effectiveness of scientific research, developmental and applicable works carried out in the country, both considering the relevance of the topics undertaken and improvement of organizational forms of the realization process.

Structure of the system

Basic elements of organizational structure of the discussed system will be:

- participants of the system;
- the Centre for Scientific, Technical and Economic Information /CSTEI/ for Polish CINTE/; and
- users of the system.

Among participants of the system we include:

1. Scientific research institutions of the Polish Academy of Sciences;
2. Universities;
3. Establishments for industrial scientific research and experimental bases; and
4. Firms and productive plants carrying on applicable works.

The main task, resulting from the fact of participation in the system, will be ensuring the prompt inflow of full information on all works covered by the system. This problem will be regulated by the proper law.

All tasks performed within the framework of the system by the Centre of Scientific, Technical and Economic Information will be of two kinds. As a participant, and at the same time the manager of the system, the Centre will be obliged to:

- carry on the central register of works covered by the system; and
- manage the central collections of source information and secondary information recorded on machine carriers.

On the other hand, as an institution rendering services to users, the Centre will supervise the efficient implementation of usable functions of the system.

Users of the system of information on scientific research, developmental and applicable works will be:

1. Main organs of state administration;
2. Central authorities and Committees of the Polish Academy of Sciences;
3. Managements of unions, works and productive plants;
4. Scientific research workers of institutions belonging to the Polish Academy of Sciences;
5. Scientific didactic and scientific research workers employed at universities;
6. Workers of industrial and scientific research, developmental and applicable bases and
7. Other persons interested in obtaining information from the system through their establishments or schools.

Each of the above mentioned participants will be able to make use of information contained in the system.

Function of the system

At present it is being anticipated that - to meet users' needs - the system must fulfil the following functions:

- registering of scientific research, developmental and applicable works undertaken within the country, as well as collecting information on them in separate data bases on machine carriers;
- recording already completed works and collecting information connected with them - among them documental analyses - in data bases on machine carriers;
- collecting of source documents, partly on microform carriers, on works already completed within the country;
- collecting of information coming from international information systems;
- meeting users' needs for information covered by the system, among them: retrospective retrieval, thematic research previous to undertaking of a work, selective dissemination of information according to users' profiles, editing permanent thematic information publications on works completed within the country, etc., and
- elaborating, on the basis of information covered by the system, analytic-synthetic materials for purposes of management, among other things materials of a statistical reporting charcter.

Besides the above mentioned functions within the framework of constant development and improvement of the system, other functions will also be introduced, resulting from the needs of the system users.

Entry to the system

Secondary information will be introduced into the system in the shape of forms elaborated by the Centre for Scientific, Technical and Economic Information. These forms will serve for modernization of the data base on machine carriers, and moreover, they will be considered - for an indefinite period of time - as the reserve information collection. At the stage of data collection there is a division of information flow into two streams: information on planned works and information on completed works. For works of the first kind there will be filled in a "Registration Card", whereas after completion of every essential stage of a particular work there will be compiled an "Information Card", and a final card submitted after the completion of a given work. In this last case, together with the "Information Card" there should be also sent to the Centre of Scientific, Technical and Economic Information the records of the work. The other kind of information coming to the system will be inquiries of users.

Output from the system

Output from the system, regarding both the form and the scope, will result from functions performed by the system and principles of gathering information that are compulsory within the system. The following forms of output are provided:

- generally accessible "Directories" - in 11 thematic serials - on completed domestic works;
- results of retrospective retrieval and thematic research in the shape of machine tables;
- answers to permanent users' inquiries, according to SDI profiles;
- analytic-synthetic elaborations for purposes of management;
- information cards on selected and completed domestic works, intended for the system of the International Centre of Scientific and Technical Information /in Russian/;
- publications of international systems; and
- source of documents of works or their microcopies.

As the system develops, it will be possible to obtain output in other forms, e.g. on machine carriers.

Principles of information offering

Access to information covered by the system will be granted in accordance with the principles existing in the country and compulsory legal rules in the field of protection of state and official secrets, as well as protection of authors and patent law.

An author of the work, within the framework of his competence, will be able to designate the scope of dissemination of the work information.

The assumption is that the collection of information on ongoing works will be a collection of essentially limited access.

Co-operation with ICSTI

To implement some functions of an information system on scientific research, developmental and applicable works, it will be necessary to keep the close cooperation with ICSTI in Moscow. The Centre of Scientific, Technical and Economic Information, acting as a national organ in the international information system of CMEA countries, will deliver to ICSTI selected information cards on completed domestic works. In return, Poland will receive from this international information system permanent information publications of ICSTI and answers to individual inquiries made by Polish users.

Assumptions for the technical project

With regard to the very great amount of information collected within the system and its multifunctionality, the effective and efficient exploitation of the system will be possible only when all processes in the system are automated to a very high degree. That is why modern informatics and duplicating equipment should be utilized to the greatest possible extent. Planned purchase of the digital system JS R-40 or R-50 should ensure the simultaneous realization and exploitation of the information system, from the point of view of informatics equipment. Methods of informatics will be employed in the process of establishing of data bases on machine carriers, and then in processes of information processing and retrieval. A part of the editorial work will also be done with the help of the digital system connected with photosetting. Besides the informatics equipment, photoreprographic equipment will also be utilized, such as photocopying frames, readers of documents recorded on microfilm carriers, etc.

Development of the system

Considering the system of information on scientific research, developmental and applicable works as the pilot system of STOIS, it should be expected that experience gained during its implementation will be used to a great extent in work on other specialized systems of STOIS.

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Summary

REGISTER AND RECRAS: TWO CASES OF COMPUTER-BASED INFORMATION RETRIEVAL SYSTEMS FOR ONGOING RESEARCH PROJECTS IN THE GENERAL SCIENTIFIC AND AGRICULTURAL SCIENTIFIC FIELDS

The REGISTER /Retrieval System for General Information on Scientific and Technological Research/ is a computer-based system for retrieval of information on ongoing research projects in Japan covering all fields of science and technology, and has been developed since 1970. Its actual operations or services were started in 1972 as the first clearinghouse service on ongoing research in Japan. Approximately 20 000 research projects for the 1974 fiscal year are filed and ready for service. The sources of the information include governmental, prefectural and non-profitable research institutions, research institutes attached to colleges and universities, and individual researchers who have got special research grants from the Ministry of Education. The data base of REGISTER is formed by assigning to research project classification codes according to a decimal classification scheme of four digits, Classification of Science and Technology, using a multi-aspect post-coordinating method. The retrieval is conducted by using and-logical expressions consisting of these classification codes as searching formulae.

The RECRAS /Retrieval System for Current Research in Agricultural Sciences/ is aimed at retrieving the ongoing research information in the fields of agriculture, forestry and fisheries in Japan. Development of the RECRAS has been executed by the Japan Science Foundation under contract with the Ministry of Agriculture and Forestry since 1972. In the developmental stage, it follows the REGISTER in ideas and method. At present in the RECRAS file a total of approximately 35 000 research projects are stored, covering the projects in 1971-75, which are or have been carried out by the Governmental and prefectural research institutions concerning agriculture, forestry and fisheries.

Résumé

REGISTER ET RECRAS: DEUX EXEMPLES DE SYSTEMES INFORMATIQUES DE DEPISTAGE DES DONNEES SUR LES RECHERCHES EN COURS DANS LE DOMAINE DES SCIENCES EN GENERAL ET DE L'AGRONOMIE

Le REGISTER /Retrieval System for General Information on Scientific and Technological Research/, est un système informatique de dépistage des données concernant les recherches en cours au Japon, qui couvre toutes les branches des sciences et de la technologie; son organisation a débuté en 1970, et il est entré en activité en 1972. Il s'agit du premier service japonais de documentation sur les recherches en cours. Le fichier contient des précisions sur quelque 20 000 projets appliqués pendant l'exercice financier 1974; ces renseignements ont été fournis par des organismes gouvernementaux et préfectoraux, des institutions de recherche à but non lucratif, des instituts uni-

versitaires et des chercheurs titulaires de bourses financées par le Ministère de l'éducation. Pour constituer la base de données de REGISTER on a attribué à chaque projet de recherche un indice de classement fondé sur une classification décimale à quatre chiffres, appelée Classification of Science and Technology, en utilisant une méthode de post-coordination à facettes multiples. Le dépistage s'effectue au moyen d'éléments ET /intersecteurs/ composés des indices de classement.

Le RECRAS /Retrieval System for Current Research in Agricultural Sciences/ est un système de dépistage des informations relatives aux recherches en cours au Japon dans les domaines de l'agronomie, de la sylviculture et des pêcheries. Son élaboration a été entreprise depuis 1972 par la Fondation japonaise des sciences en exécution d'un contrat conclu avec le Ministère de l'agriculture et de la sylviculture, selon des conceptions et des méthodes inspirées en partie de celles du REGISTER. Le fichier RECRAS porte à l'heure actuelle sur environ 35 000 projets, que des institutions gouvernementales ou préfectorales s'occupant de recherches sur l'agriculture, la sylviculture et les pêcheries ont menés à bien ou appliquaient pendant la période 1971-1975.

REGISTER AND RECRAS: TWO CASES OF COMPUTER-BASED INFORMATION RETRIEVAL SYSTEMS FOR ONGOING RESEARCH PROJECTS IN THE GENERAL SCIENTIFIC AND AGRICULTURAL SCIENTIFIC FIELDS

T. YOSIMURA

1. Preface

REGISTER /Retrieval System for General Information on Scientific and Technological Research/ has been developed since 1970, and started its actual operation in 1972 under the Japan Science Foundation as the first clearing service in Japan. It aims to retrieve ongoing research projects in Japan, covering all fields of science and technology.

RECRAS /Retrieval System for Current Research in Agricultural Sciences/ aims to retrieve the ongoing research information in the fields of agriculture, forestry and fisheries in Japan. Development of system and storage of data has been initiated; approximately 35 000 research projects are stored in the RECRAS file.

REGISTER and RECRAS are two examples of computer-based information systems to retrieve ongoing research projects in Japan; both systems are based on similar ideas, that is, a man-machine co-operation system. A multi-aspect post-coordination decimal classification scheme with four digits is used in forming the data base for filing and for retrieval, and to define searching formulae. In ordinerly cases, plural classification numbers are given for each research project. The retrieval is first conducted by computer, and secondly manually using a micro-reader-printer.

Some problems in operation and building of these two information systems to retrieve ongoing research projects will be discussed.

2. Register

2.1 Outline

The outline of REGISTER is shown in Fig. 1.

2.2 Database

Ongoing research projects being carried out by staffs of research institutions of national, municipal and non-profitable organizations or attached to colleges and universities, and also by grantees from the Ministry of Education, are included in the database of the system.

As is shown in Table 1, all research projects carried out in 1973 and new projects in 1974 are stored at the present time. About 50 per cent of these research projects are assumed to be continuously carried out in 1975. New projects started in 1975 are now in preparation by the Foundation.

Most of information on research projects has been collected from the replies submitted to a questionnaire for each institution. And a few have obtained from published information of the institutions.

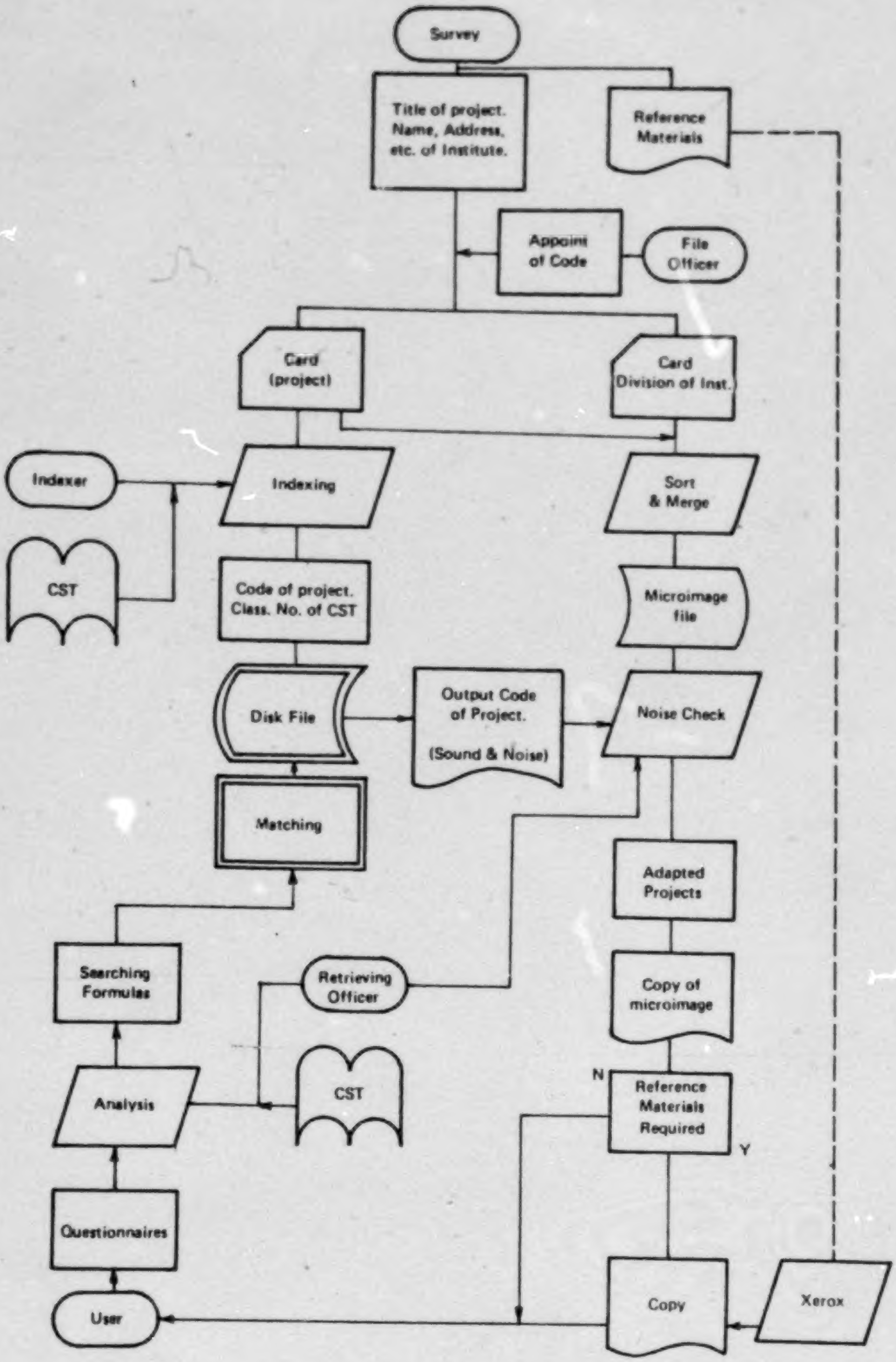
Survey
Title of project. Name, Address, etc. of Institute.
Reference Materials
Appoint of Code
File Officer
Card (project)
Card Division of Inst.
Indexer
Indexing
Sort & Merge
CST
Code of project. Class. No. of CST
Microimage file
Disk File
Output Code of Project. (Sound & Noise)
Noise Check
Matching
Adapted Projects
Searching Formulas
Retrieving Officer
Copy of microimage
Analysis
CST
N
Reference Materials Required
Y
Questionnaires
User
Copy
Xerox

Fig. I Outline of REGISTER

2.3 Retrieving methods

To analyse projects and to define search formulae, a multi-aspect post-coordination decimal classification scheme with four digits has been prepared.

Usually a classification scheme and/or keywords have been used to retrieve information. For the ongoing research projects, however, a classification scheme is thought to be more effective to use than keywords for the following reasons.

The keywords which are applied in a system have to be actually used in the subject fields. On an ongoing research project, however, words which are not yet widely accepted in science are supposed to appear frequently. To avoid this inconsistency, a classification scheme, in which a subject is grouped by concept, is thought to have an advantage over keywords.

2.4 Classification scheme

One of the characteristics of the system is the application of a post-coordinating method adopting the Classification of Science and Technology /CST/ which is a classification scheme especially designed for the REGISTER.

The pre-coordinating method has widely been used in systems, for biological classification or library classification. With this method, a specified position for subjects, which are expected to appear, has to be fixed previously within the scheme. Thus it is necessary to set up many classes in a scheme to classify the subject in full detail, and as a result, the complexity of a classification-number is increased considerably in case of a decimal classification.

On the REGISTER, a post-coordinating method is applied to classify the ongoing project, that is, detail of a subject is shown by an assemblage of several items in the scheme. Thus to classify the project more precisely, a subject can be analysed from many different aspects, by increasing the number of items.

An indirect definition method to clarify the meaning of each item of the CST is an other characteristic of the system.

Many concrete words including synonyms and narrower terms are enumerated under each item, and thus each item is indirectly defined by these words. In applying this method, additions of newly required words are rather easy and the system becomes more practical as a whole.

The number of items in CST is about 2200 and the number of words used to define these items are about 12 000 at the present time.

The outline of CST /classes and divisions/ is shown in Table 2. and 3.

2.5 Indexing

The persons in charge of indexing a research project are the research workers and information specialists contracted by the Foundation, in science and technology, who have worked for more than ten years after graduation. Since the system covers all fields of science and technology, the indexing is carried out by about 30 research wokers in the field of physics, chemistry, engineering, electronics, biology, agriculture, and medicine.

Each project is indexed by six workers of different specialties. Each person indexes the project from his special point of view. Thus all the projects are viewed and indexed from at least six different points of view, and the multi-aspect post-coordinating method can be expected to give full scope.

Table 1. DATABASE of REGISTER

REGISTERED YEAR / INSTITUTES	1973			1974		
	number of institutes	number of divisions	number of projects	number of institutes	numbers of divisions	number of projects
national	119	715	5,824	* 79	375	1,684
non-profitable	9	58	220	87	204	1,022
attached to univ.	182	930	4,688	177	549	2,331
municipal	164	274	2,039	* 236	782	3,823
museum etc.				11	14	66
Grant in edu. for scientific research						6,228
TOTAL	474	1,977	12,771	590	1,924	15,154

* exc. Institutes of Agriculture, Forestry & Fisheries.

Table 2. NUMBER OF CST CLASSIFICATION DIGITS

CLASS	0	1	2	3	4	5	6	7	8	TOTAL
DIVISION (2-digit code)	10	8	7	7	9	8	7	7	10	73
SECTION (3-digit code)	52	57	23	36	45	42	53	37	34	379
SUBSECTION (4-digit code)	198	354	104	107	128	205	366	155	134	1,751

Table 3. CLASSIFICATION OF SCIENCE AND TECHNOLOGY (CST) (1)

CLASS DIVISION	0	1	2	3	4
	Place, Time, Quality, Quantity etc.	Physical Sciences (incl. Mathematics)	Materials	Energy	Information
0	General	General	General	General	General
1	Climatic zone, Land	Mathematics	Resources, Search of Resources	Sources of Energy	Types of Information
2	Hydrosphere (Sea, River, Lake)	Astronomy, Geodesy, Mesurement of time	Gathering/ Picking of Resources	Energy Conversion	Media of Information
3	Space	Physics	Raw Materials	Waste Energy Treatment	Information Management
4	Oceans of the World	Chemistry	Industrial Processes (chemical)	Types of Energy for Use	Systems Engineering
5	Regions/ Countries of the World	Crystallography, Mineralogy	Products of Materials	Energy Transfer	
6	Regions/ Prefectures of Japan	Earth Sciences, Oceanography	Waste Treatment	Energy Storage	Unit Processing (mechanical)
7	Time	Meteorology, Climatology			Integrated Processing (mechanical)
8	Quality, Quantity				Communications
9	Standards, Reviewing, Tests, Reliability				Others

Table 3. CLASSIFICATION OF SCIENCE AND TECHNOLOGY (CST) (2)

CLASS DIVISION	5	6	7	8
	Industrial Processes (physical), Transportation, Storage	Biology, Agricultural Sciences	Medicine, Pharmacy, Psycology, Veterinary Medicine (incl. every vertebrate)	Related Problems
0	General	General	General	General
1	Materials	Biology (excl. Morphology)	Morphology (Tissue, Organ, Organ System)	Regional Development
2	Unit Processing	Morphology (Tissue, Organ, Organ System), Anatomy (excl. Vertebrate)	Diseases	Sciences of Home Economics
3	Integrated Proceesing	Microbes, Plants	Diagnostics, Therapeutics, Nursing	Prevention of Natural Damage & Pollution
4	Products (Machines, Buildings, etc.)	Animals	Anatomy	Police, Fire Fighting, Defence, Safety
5	Transportation	Products of Agriculture, Forestry, Fisheries	Hygiene, Public Health	Economics, Administration & Management
6	Storage	Plant husbandry, Soil Science Fertilizer, Agronomy, Horticulture etc. Forestry	Pharmacy, Pharmacology, Drug Therapy, Toxicology	Law, Politics, Sociology, Social Welfare
7				Learning, Education
8		Animal husbandry, Fisheries		Industries, Occupations
9				Others

2.6 System file

2.6.1 Microimage file

Research projects are stored on a cassette type microfilm, photographed from the project card and division card. Each frame of the microfilm contains several research projects carried on at the same division of an institute.

2.6.2 Computer file

The computer which has been used in this system is HITAC-8400.

Elements for filing each project are a code number of the project and the classification numbers which are given by indexing.

2.7 Information retrieval

2.7.1 Machine retrieval

A question coming from the user is analysed and a formula, which consists of classification numbers, is prepared by a retrieving officer. At the present time, information retrieval by computer is handled in batch mode.

The answer obtained by machine retrieval is the code number of the projects.

2.7.2 Manual retrieval

Depending on the code number obtained by machine retrieval, an image of the project is displayed on a micro-reader-printer, in which the microimage file is mounted. After elimination of noise, appropriate projects are immediately copied by the retrieval officer.

2.8 Services of the REGISTER

Services of the system are output copies of the microimage and/or copies of reference materials related to the project.

As input cost of the REGISTER is covered by the Foundation, the customer pays only output cost. These are a retrieval charge /¥2500 per formula/, rent for the computer /¥1000 per minute/, a copy charge /¥100 per page/, etc.

Since the beginning of services in 1972, most of the customers are information specialists in large businesses, who receive requests from research scientists or developmental planners. Questions also have a tendency to be directed toward a little known subject field for their own business.

The number of customers is increasing gradually, and at the present time a question comes once or twice in a week.

2.9 Future plans

The REGISTER is a system of man-machine cooperation, but it seems to depend mainly on man-power at the presnt time. As the demand for searches is not so frequent for the moment, the system works fairly well supported by well-trained indexers and retrieval specialists. However, it is necessary to reduce the work requiring well-trained manpower, in the future.

That is, the system is to be designed so that indexers and retrieval officers will have finished masters degree in a specific field of science and have been trained in information processing for some time.

Concerning machine retrieval, since complete information cannot be retrieved at once by a formula, which is laid down by a well trained retrieval officer, it is necessary to interact with the computer.

To make the system better, the Foundation is sponsoring a project to revise the CST, to describe the database in detail, and to introduce a question-and-answer method applying a character-display device in machine retrieval.

3. RECRAS

The RECRAS is a system based on the same idea and method as the REGISTER, and thus characteristics of the system are mentioned in detail in comparison with the REGISTER.

3.1 Database

The RECRAS handles ongoing research projects in agricultural sciences carried out by staffs of research institutions of national and municipal organizations within the control of the Ministry of Agriculture and Forestry.

Information on a research project is collected directly from the research scientist of the project, including an outline of the project in 60-200 Japanese letters. This means that information of the RECRAS is more detailed than the REGISTER.

3.2 Classification scheme

As in case of the REGISTER, the Classification of Agricultural Sciences /CAST/ is developed in the same form. However, since the RECRAS is a system for agricultural sciences, the CAST is prepared laying stress on subjects in biology, agriculture, and medicine. In these fields, the classification scheme is divided into finer subjects than the CST.

The number of items in CAST is about 2200 and terms used in the scheme number about 12 000.

3.3 Indexing

Although persons in charge of indexing are researchers in all fields of science in case of the REGISTER, indexing is carried out by agricultural scientists in the RECRAS. Each indexer of the REGISTER scans all projects from his special point of view. However, in RECRAS, the projects are divided into specific fields of agricultural sciences /i.e. horticulture, animal husbandry, agricultural engineering, forestry, etc./, and each indexer handles the projects related to his own specialty and assigns classification numbers of all classes.

The reason for use of this method in RECRAS is that the projects concern only agricultural sciences and an outline of each project is obtainable, as well as because of financial insufficiency. It shortens the time of indexing, and gives better results in analysis of the specialized field related to indexer. However, there is the possibility that the advantage of the multi-aspect post-coordinating method as used in the RECRAS is rather reduced.

An other characteristic of indexing in the RECRAS is to adopt modifier in addition to assigning the classification numbers for a project. The modifier is usually used when there is a need of a narrower concept for the project than that of the classification number.

For exampl , cattle is represented by the number of 1472 in the classification scheme, and it includes beef cattle, dairy cattle, Jersey, Holstein,etc. Thus the project only concerns on beef cattle, the indexer appends beef cattle as a modifier, along with the classification number.

There is no control of words as the modifier. However, it has been suggested to the indexers that names of plants and animals, their breed, districts, substances, instruments, methods of investigation, should soon be included as the modifier.

3.4 Information retrieval

The use of the modifier as a key for retrieval in the RECRAS is one of the advantages over the REGISTER. The modifier is not used for machine retrieval, but only for manual retrieval at present. Eliminating noise by applying the modifier saves time in searching on microimage file, especially in the case of information retrieval on specific species of plants and animals.

3.5 Services of the RECRAS

The System is almost complete in its construction and able to serve for users, but it is not operated for the public at present.

4. Dicussion

4.1 Need for services

As stated in the chapter 2.8, need for the REGISTER services is not very great at present. The following reasons for this fact are considered.

The REGISTER is the first information service for ongoing research in Japan, and the Foundation does not pay to much effort on positive publicity for the REGISTER. Also, the Japanese scientists are in the habit of taking an interest in specialized small field, and unused to advance their research by taking a bird's eye view of the wider area surrounding their specialized field.

On the other hand, judging from the fact that the customers of the REGISTER are the large businesses, who make inquiries time after time once they use it, information obtained from the ongoing research projects appears to be of service for research management, technical development, determination of management policy, and so on.

As the need for the services increases gradually, a general rule that the need for information services is flourishing by degrees by opening a channel for services and giving better information for customers, is thought to be valid for the information services on ongoing research projects.

The RECRAS service is not available for the public, but the Ministry of Agriculture and Forestry are interested and look forward to the development of the system.

4.2 Utilization of the REGISTER other than the services.

The information obtainable from the REGISTER is expected to be of further use in searching mutual relations among the different categories of science and technology, and also in obtaining, essential information for planning the policy of scientific and technical research.

4.3 System operation

Both systems, REGISTER and RECRAS, are operated as computer-based information systems. As the systems are not very complicated and the programs are rather simple, there is not much difficulty with techniques for machine retrieval.To improve these two services, collection of information for the database, the classification scheme, and personnel factors are the important elements.

4.3.1 Collection of information for database

There are some inappropriate or insufficient descriptions of the titles and the outlines of research projects, which are collected from research scientists. As standardization on writing scientific papers in Japan is not well established, there are some research projects with titles indicating, a broader meaning than the actual research project and including specific abbreviation of words used only in a specialized field, and with outlines which do not indicate subjects or methods of the research. One of the factors in this problem is that the scientists and the management officers in research are unaware of the importance of describing titles and outlines of the projects for information dissemination.

As the information services on ongoing research are gaining ground gradually, these difficulties will be improved in near future, but it is necessary to push forward the standardization on a descriptive method for research projects.

4.3.2 Classification scheme

The CST and the CAST are considered to be available without any modification in the classes and divisons of the scheme for a while. However, it will be necessary to revise the scheme in time, with changes in research objectives and with advances in research methods.

4.3.3 Indexer and retrieval officer

Evidently the systems are not meant to service only research scientists in the same or a closely related field to a given project. Thus it is necessary to index the subject from as many stand-points as possible.

There are two different methods for analysing the subject. One is to analyse the subject by an indexer, whose interest is in the same field as the subject. And the other is to index a subject by several indexers who have worked in different scientific fields. In comparing these two methods, it becomes clear that the latter method is indispensable in bringing the merit of the multi-aspect classification method into full play, because a scientist as an indexer has a tendency to analyse the project from his specialized viewpoint.

Indexing in this way, however, takes a long time and requires many indexers and much expense.

Only a few officers for information retrieval are needed for operation. However, it is desirable to carry it out by the officers who are well informed on all aspects of the system, especially on the classification scheme, and who are able to advise the customers.

To cultivate retrieval officers of ability, as well as to engage many indexers for the system is the crux of the problem, at present and in future.

REFERENCES

1. YOSIMURA, T. Development of Retrieval System for General Information on Scientific and Technological Research. Information & Documentation. 14, 9, 1971, p. 567-578.

2. YOSIMURA, T. The Classification of Science and Technology. Journal of the Japan Documentation Society. 22, 12, 1972, p. 399-409.

3. YOSIMURA, T. and IGARASHI, H. Retrieval System on Research Projects of Agricultural Sciences - RECRAS. Science & Technology Information Service. No. 41, 1974, p. 1-14.

4. YOSIMURA, T. and IGARASHI, H. Correlation between the Number of Codes Used in Searching Formulae and the Number of Current Research Projects Retrieved. Library and Information Science. No. 12, 1974, p. 155-175.

5. YOSIMURA, T., IGARASHI, H. and OKINAGA, T. On the Retrieval System for General Information of Scientific and Technological Research /REGISTER/ and the Classification of Science and Technology /CST/, Journal of the Japan Documentation Society. 24, 12, 1974, p. 493-503.

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Summary

RESEARCH REPORTING FACING WORLDWIDE INFORMATION TECHNOLOGY

Research stands out as an activity of its own, yet its objectives, justification and methods may point toward official or private institutions national or international programs or information systems; its isolation may be neutralizing, its integration will garanty mutual efficiency.

Organized and timely knowledge is a major determinant of economic growth, the establishment of an international reporting system for ongoing research is a determinant factor for narrowing the technology gap between developed and developing nations. International policy directives, guidelines and technical aids act as polarizing factors for establishing compatible and generalized reporting practices.

The needs and means of regulation remain however in most cases under the control of local governments. Legislation generalizing and enforcing reporting measures is the surest way for establishing a reliable research reporting network. The publication of patent applications would provide a disclosure of some of the private or corporate research well ahead of the issued patents in most countries. Complementary information may be provided by the International Patent Organization /WIPO/ or an eventual international register of scientists.

Existing Research Information Systems, such as the SSIE have developed information techniques suited to their own needs; their indexing, terminology and classification systems may pave the way toward self-organizing systems and in this manner contribute to the evolving international information technology.

The growing specificity of elements, as exemplified in the bibliographic data, is likely to occur also in research elements. More details in the analysis of research projects or reports, their correlation to their information sources, their display for ready interpretation, their simulation through research slanted computer programs are all on the road of progress.

The most exhaustive inventory and the widest vision of the evolution of these various factors, may provide the largest basis for establishing, consolidating or adapting ongoing research reporting techniques and founding a compatible worldwide system of its own kind.

Résumé

ETABLISSEMENT D'UN REGISTRE DES RECHERCHES EN UTILISANT LA TECHNOLOGIE UNIVERSELLE DE L'INFORMATION

La recherche constitue une activité autonome mais, par ses objectifs, sa justification et ses méthodes, elle s'oriente vers des établissements officiels ou privés, des programmes ou des systèmes d'information nationaux ou internationaux; en s'isolant, elle risque de rester inefficace; en s'intégrant, elle s'assure une efficacité mutuelle.

Les connaissances organisées et à jour constituent une base majeure du développement économique, l'établissement d'un système international de registre des recherches en cours est un des facteurs déterminants contribuant a diminuer l'écart technologique entre les pays développés et en voie de développement. Les directives et aides techniques internationales exercent un effet de polarisation pour la création d'une pratique compatible et généralisée d'enregistrement.

Les conditions et méthodes de règlementation restent cependant, la plupart du temps, sous contrôle des gouvernements locaux. Une législation généralisant et rendant obligatoire l'enregistrement des recherches constitue le meilleur moyen de créer un réseau fiable de registres des recherches. La publication des dépôts de demandes de brevets d'inventions permettrait de connaître bien avant la sortie des brevets dans la plupart des pays les recherchent en cours des chercheurs privés ou associés. L'Organisation Internationale des Brevets d'Inventions /WIPO/ ou un registre éventuel des scientifiques pourraient assurer des informations complémentaires.

Les systèmes d'information de recherche existants tels que le SSIE ont développé les techniques d'information en fonction de leurs propres besoins; leurs systèmes d'indexation, de terminologie et de classification pourraient ouvrir la voie vers des systèmes d'auto-organisation et contribuer, par là, à l'évolution de la technologie internationale de l'information.

La spécification grandissante des éléments, illustrée par les faits bibliographiques, se manifeste également dans les éléments de recherche.Plusieurs détails dans l'analyse des projets et rapports de recherche, leurs relations avec leurs sources d'informations, leur accès, leur simulation par des programmes d'ordinateur de recherche sont en progrès.

Un inventaire aussi complet que possible et une vue exacte de l'évolution de ces divers facteurs sont susceptibles de jeter de larges bases à l'établissement,à la consolidation ou à l'adaptation des techniques d'enregistrement des recherches en cours et à la création d'un système universel et compatible.

RESEARCH REPORTING FACING WORLDWIDE INFORMATION TECHNOLOGY

C.R. CAVALCANTI

The present tendencies point toward a coordination of data and information in view of increased interpenetration of the sciences and universal communication through compatible systems and methodologies.

If this trend can be explained by simple theoretical speculation, the evolution of international relations affected by rapid transportation and communication media make this development irreversible.

These facts may be observed and registered, tabulated and interpreted and may show the already existing methodologies and determine the prevalent systems components.

On the basis of these observations, one may attempt to identify, define, codify and normalize the above elements. Such operation may be attempted in different areas or branches of sciences, or within already existing systems, such as in some of the international organizations like the International Atomic Energy Agency /IAEA/, the Food and Agricultural Organization /FAO/, the United Nations Industrial Development Organization /UNIDO/.

It is natural that like in the development of local, regional, or national systems, each unit justifies its own solutions and is reluctant to be influenced by conflicting solutions of other institutions. For as far as this may concern operations within the respective spheres of influences, such tendencies may be self-evolving and even desirable.

An other important factor, however is that cooperation between institutions and interpenetration among the field of sciences is also an evident aspect of modern society.

Research is perhaps the field in which these aspects are the most evident because, by definition, research essentially consists in innovating and changing existing patterns, in crossing inter-disciplinary boundary lines.

The reporting of research should therefore be considered from different points of view:

1. The reporting of its documentary or identifying elements which are relatively easy to list as:
   - reporting institution,
   - object of research project,
   - research program,
   - duration of research project,
   - summary of project description,
   - project personnel, manager, scientists and assistants,
   - summary of estimated costs, direct or indirect, salaries, materials, supplies, travels, etc.,
   - total amount,

- institution's total budget,
- various administrative data.

The international coordination for bringing these elements together, so that they can be as soon as possible available in the source country, but also in other countries, developed or developing, is a desirable goal for disseminating information about ongoing and eventually past research and research projected for the future.

The normalization of the reporting techniques, the periodicity, the forms, the terminology used, are important.

2. In regard to the abstract or summary of project description, as well as the listing of research results or publications, one enters into the field of the subject of research itself. In order to identify the subject elements for definitions or user communication, one may adopt various criteria:

   a/ the prevalent methodology of each research institution,

   b/ the reference to more general indexing or classification schemes which bring the research techniques close to library or information systems techniques,

   c/ the development of a subject research reporting system, which would tie-in with a broad ordering system, with eventual cross-referencing to already existing major classification schemes.

   Besides this, it may be desirable to provide an additional facet-type solution, which may focus the research aspect on the subject elements involved.

3. A compatibility between systems is naturally desirable. To obtain such compatibility one may give priority to the relations between systems which may naturally tend to communicate information among them.

   In regard to research one may think about the classification developed for WIPO /World Industrial Property Organization/ and also the systems developed for some of the more technical agencies of the United Nations, such as IAEA, FAO and UNIDO.

The timely reporting of research projects is facilitated through the already existing systems in the various countries, but there are areas, mainly in private or even international corporations, where the public reporting habits are ignored.

Ways or regulations may be studied to remedy this situation. There is one possibility which may utilize the existing deposit procedures for patents, to make research appearing in patent descriptions or claims, more readily available.

Generally, patent information is published when the patent is issued. This may occur according to the different countries with little or much delay.

If the patent subject title and class were disclosed at the time of the patent application, much research could be divulged immediately and such service would be similar to the various existing literature dissemination services.

Within the general tendencies developing under the UNISIST guidelines, one may envision a progressive exhaustive integration in the various fields of science and technology.

Parallely, those various integrated sectors will develop needs for intercommunication.

When speaking about automation, one will have to adopt and adapt the systems and techniques used, according to the information processed.

The compatibility of codes and other identification or processing media becomes more and more necessary.

It is in the light of this observation, that the planning of a system or methodology for ongoing research reporting should be based on the widest range of possible applications, and connexions with other information services.

As often has been said, the time has come to think about a science of science, a science of information, and also a science of research which would not only be concerned about reporting, but also about the entire cycle of the research activity:

- the history of research,
- the prevailing habits and techniques for research,
- the equipment which eventually may be used to facilitate the access to information about past and present research.

As a conclusion, one may emphasize the necessity to solve the research reporting needs through a system which may enlarge the framework of existing systems and introduce elements which provide a maximum of access points to relevant information within other information systems.

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